Draft Study Material

ROTO ARTIST

(Job Role)

(Qualification Pack: Ref. Id. MES/Q3504)
Sector: Media and Entertainment

(Grade XII)

PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION
(a constituent unit of NCERT, under Ministry of Education, Government of India)
Shyamla Hills, Bhopal - 462 002, M.P., India

Preface

Vocational Education is a dynamic and evolving field, and ensuring that every student has access to quality learning materials is of paramount importance. The journey of the PSS Central Institute of Vocational Education (PSSCIVE) toward producing comprehensive and inclusive study material is rigorous and time-consuming, requiring thorough research, expert consultation, and publication by the National Council of Educational Research and Training (NCERT). However, the absence of finalized study material should not impede the educational progress of our students. In response to this necessity, we present the draft study material, a provisional yet comprehensive guide, designed to bridge the gap between teaching and learning, until the official version of the study material is made available by the NCERT. The draft study material provides a structured and accessible set of materials for teachers and students to utilize in the interim period. The content is aligned with the prescribed curriculum to ensure that students remain on track with their learning objectives.

The contents of the modules are curated to provide continuity in education and maintain the momentum of teaching-learning in vocational education. It encompasses essential concepts and skills aligned with the curriculum and educational standards. We extend our gratitude to the academicians, vocational educators, subject matter experts, industry experts, academic consultants, and all other people who contributed their expertise and insights to the creation of the draft study material.

Teachers are encouraged to use the draft modules of the study material as a guide and supplement their teaching with additional resources and activities that cater to their students' unique learning styles and needs. Collaboration and feedback are vital; therefore, we welcome suggestions for improvement, especially by the teachers, in improving upon the content of the study material.

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Date: 17 September, 2024

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Module 1 Drawing and Animating Roto Shapes

Module Overview

Shapes are integral part of rotoscoping created over the focus object and animated according to object motion. It is important to understand the roto objective before creating shapes. The shot duration for rotoscoping, footage stabilization, identifying focus object, matte uses, edge feather need to be observed before creating shapes.

There is various software to perform rotoscoping. In out book we will be using SilhouetteFX software. In this unit you will learn the basics of SilhouetteFX. You will be able to work with its interface, sessions, trees, nodes, shapes, layers, object and object list. Further you will be able to draw shapes over the focus object by using roto shapes like Bezier, B-spline and X-spline. The use of open shapes, blend mode and reshape tools is demonstrated. Then you will know about the technique of animation shapes. You will be able to use transform tools is used, which is divided into shape and point mode. It is further demonstrated to animate the roto shapes by using various key-framing techniques.

Learning Outcomes

After completing this module, you will be able to:

- Understand the foundational skills and knowledge required for effective rotoscoping.
- Describe the learn techniques for working with silhouette images in rotoscoping and animation.
- Explore the skills required to draw and manipulate shapes for animation and visual effects.
- Demonstrate the apply techniques for animating shapes to create dynamic and engaging visual content.

Module Structure

Session 1: Rotoscoping Pre-Requisite
Session 2: Working with Silhouette
Session 3: Drawing Shapes
Session 4: Animating Shapes

Session 1: Rotoscoping Pre-Requisite

A teacher asked to students about their planning to spend the vacation after examination. Rohan expressed his feeling that he loves the mountain and want to spend the vacation in hill station. But he was not aware about the climate, mountain road and safety measures for mountain traveling. The teacher told him to take the basic information about the hill station which he wants to visit. Because it is essential to know all about the culture, clothing, the way to reach, food habits and accommodation etc. for visiting any hill station. (Figure 1.1) Thus, you should have a proper travel plan to visit any place, which includes, travel guides, maps, clothes according to climate and safety equipment.

Fig. 1.1 Rohan is thinking about a trip to the mountains Courtesy- Freepik.com

In the same way if you wish to learn rotoscoping, you should be well prepared with rotoscoping basics. Planning and preparation is important in rotoscoping. In this chapter, you will understand the rotoscoping basics to start with rotoscoping. It is essential to understand rotoscoping basics before rotoscoping a shot.

1.1. Important terms in Rotoscoping

You need to understand the following terms to do the rotoscoping in a specific shot.

1. The shot length – Duration of video footage for rotoscoping.
2. Stabilization of the Footage – Stabilize shaky and jerky video footage before roto.
3. Identification of the objects for rotoscoping – Object which is going to isolate from the video footage.
4. Matte usage – Identify the final use and motion path of the matte.
5. Edge and Shape – Technique of breakdown an object in shapes, considering the edge.
6. Edge Feather – To create softness at the outer edge of an object.
7. Multiple Shape – Breakdown an object in two or more basic shapes.
8. Positive Space – A space within footage to place a different object.
9. Motion Path – A route shapes takes, while moving with object.

Let us now discuss these terms in detail.

1. The Shot Length

It is essential to determine the duration of the shot before conducting rotoscoping. Consider a shot of 150 frames for rotoscoping. If matte is needed only for the focus

object between 75 to 150 frames, then it is worth to concentrate on these frames for rotoscoping without wasting the time on other part of the footage.

To complete the rotoscoping within the stipulated time period consider only those frames which needs roto. So, focus on the rotoscoping details which are provided by the client.

Know More...

Focus object is the object, which is going to isolate or separate from frame. In Figure 1.2, boat is a focus object.

Fig. 1.2: Focus Object (Courtesy Author)

Matte is a black and white frame or a set of frames that tells the software what is visible and what is not. In Figure 1.3 white is visible while black is invisible. You can observe the final output in Figure 1.4.

Fig. 1.3 Matte (Courtesy Author)

Fig. 1.4 Colour Comp of matte (Courtesy Author)

2. Stabilization of the Footage

Once the shot length is fixed, play the video footage and watch its motion. If it is shaky and jerky, then to stabilize video footage before start rotoscoping. This will save the time while rotoscoping. Practical Activity 1.1 illustrates the method to stabilize video footage in Adobe Premiere Pro software.

Practical Activity 1.1 – Stabilize shaky video footage in Adobe Premiere Pro

Step 1. Import the footage into the 'Project window' of Adobe premiere editing software and insert it on timeline, as shown in Figure 1.5

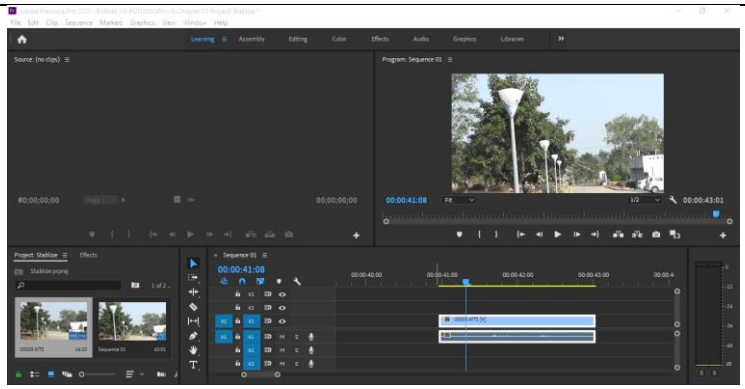


Fig. 1.5 Import the footage in editing software (Courtesy Author)

Step 2. Now to stabilize the footage apply Warp Stabilizer video effect over the footage as shown in Figure 1.6

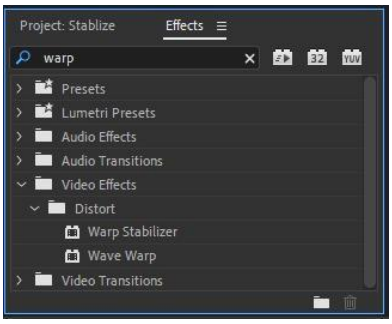


Fig. 1.6: Select Warp Stabilizer (Courtesy-Author)

Step 3. Drag and drop this effect over the footage on timeline. This effect will analyze the motion shake of the video footage initially and then stabilizes it as shown in Figure 1.7 & 1.8.

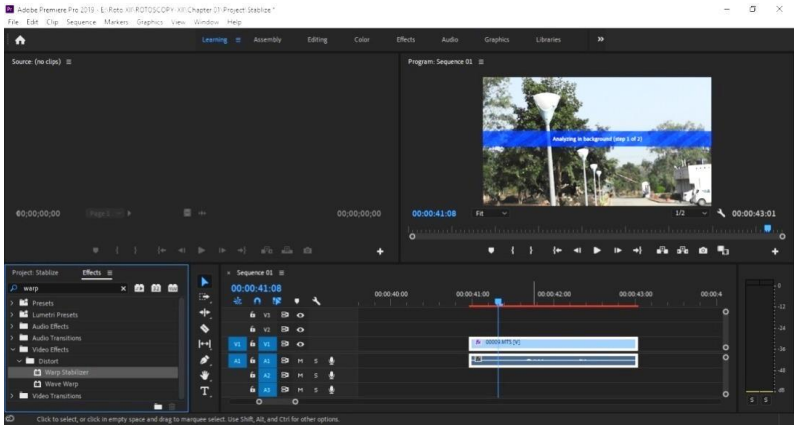


Fig. 1.7: Drag and Drop the effect over the video footage (Courtesy Author)

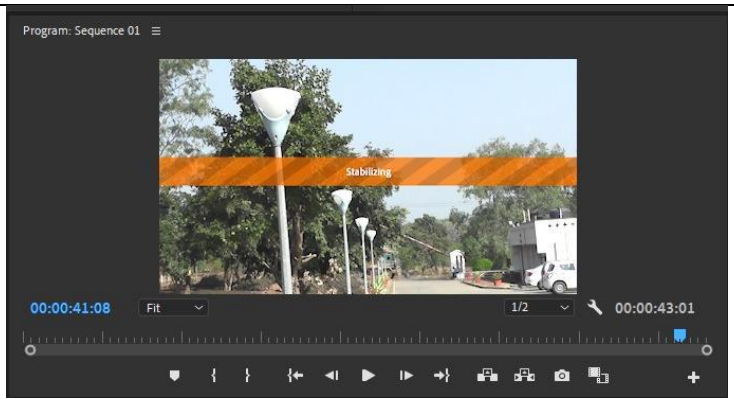


Fig. 1.8: Video effect is being applied on the footage (Courtesy-Author)

Step 4. After applying this effect on the video footage, export the video in desired format for rotoscoping. To export the video, select **File> Export> Media**. Choose the desired format, browse the destination location and click on Export, as shown in Figure 1.9.

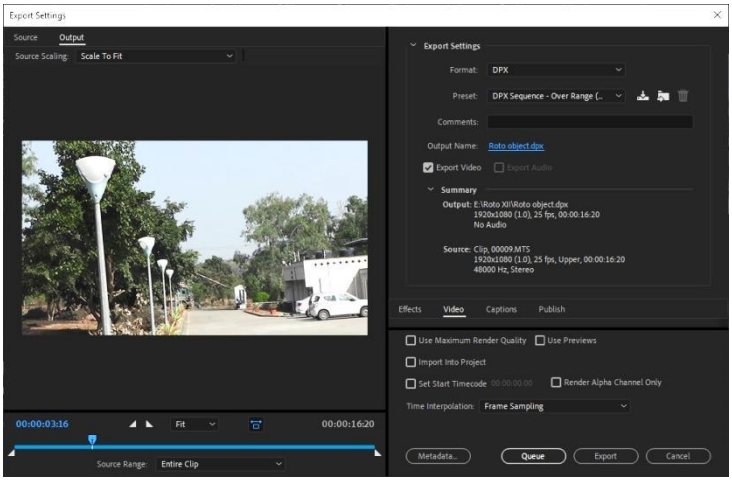


Fig. 1.9: Export the video in desired format (Courtesy-Author)

Assignment 1.1

Shoot a video footage from Mobile/DSLR and stabilize it.

3. Identification of the Focus object for rotoscoping

After stabilizing the footage, you need to recognize the object to be isolated from the frame. In Figure 1.10, Lamp-post is a focus object which will be isolated from the frame.

Fig. 1.10 Focus Object in the frame Courtesy-Author

4. Matte Usage

After identifying the focus object, you need to understand the final use of matte. This will help you to identify the area of more focus. It is better to get style frame from the compositor before starting rotoscoping. Style frame is a frame, which reveals, what

exactly is going to happen in final frame. With the help of style frame, you can easily distinguish the focus object.

There are three paths 1, 2 and 3, as shown in Figure 1.11. Suppose in final shot, a leaf is falling from the tree behind the squirrel and follow the path 1 or 3 then you need roto the wood not the squirrel. You need to roto the squirrel, if only the path 2 is followed. It also depends upon the movement of the focus object in this case squirrel is focus object. So, style frame is very necessary to define the roto object.

Fig. 1.11 Matte Uses (Courtesy-Pixabay.com)

Assignment 1.2

In a given video frame, mention the possible path to perform Roto of a character moving towards sea. As shown in Figure 1.12.

Fig. 1.12 Identify the possible path of a man to reach sea (Courtesy-Pixabay.com)

Know More...

Style Frame – A style frame is a snapshot of a finished frame as it would look within a longer animation. In Figure 1.13 It aims to capture a still image of overall look and feel of an animated or live action video.

Fig. 1.13: Style frame from 'twinings tea' advertisement (Courtesy-TwiningsUK)

5. Edge and Shape

Once the range of shot imports on timeline, watch the footage and playback it in a loop to find out important frame. Here, **Shape** and **Edge** are basics of Rotoscoping. A Roto-artist watches the frame in the form of shape and edge. Every visual element can be separated and defined into smaller, easily animated shapes, which follows a distinctive motion path. It is similar to basic drawing techniques for making image with basic shapes. Use these simple drawing techniques to breakdown the focus object in various shapes as shown in Figure 1.14.

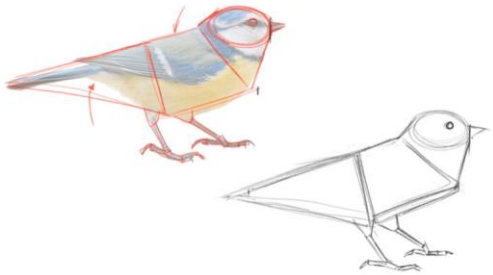


Fig. 1.14: Bird's drawing using basic shapes (Courtesy-Author)

Fig. 1.15: Different roto shapes in green outline (Courtesy-Author)

Edges are another consideration of a roto artist's focus. It is the most important element, what we get as a final matte while doing roto. Figure 1.15 shows how the edge of the picture is separated. Edges is another consideration of roto artist's focus.

Fig. 1.15 (a) Shape in blue overlay

Fig. 1.15 (b) Edge in red outline

Shapes are used to identify and isolate form and motion, whereas edge shows the perfection in roto object. To extract the focus object from the video footage, view the focus object such that it should fully appear on the screen, so that even if it disappears behind another element in the footage, you can still manipulate the shape.

6. Edge Feather

Edge feather refers to the softness of the shape edge. Roto Artist should confirm the requirement of the edge feather from compositor before starting rotoscoping. Because once it is applied on the roto object, it cannot to revert easily. In Figure 1.16 Edge feather should be applied carefully well after knowing the requirement.

Fig. 1.16 Edge feather Courtesy-Author

7. Multiple Shapes

In graphics, a single outline is created for entire focus object, but in case of Roto, it is difficult to rotoscoping a single shape, particularly if focus object has multiple moving shapes. Breaking down the focus object into multiple shapes makes rotoscoping more manageable than working on the single shapes.

Using just one spline for a focus object with multiple moving parts would be a nightmare in almost any mildly complex roto shot. In Figure 1.17 (a), the boat on the lake is being isolated with single spline, which looks fine for just the one frame. But when you move to the next key frame, everything about the figure has changed. To create the second key frame, you'd have to move every single point on this spline to a new position. In Figure 1.17 (b), the boat is breakdown in multiple shapes. So as the focus object moves, you can easily modify the shapes accordingly.

Fig. 1.17 (a) Breakdown of Focus Object in Multiple Shapes Courtesy-Author

Fig. 1.17 (b) Breakdown of Focus Object in Multiple Shapes Courtesy-Author

8. Positive Space

A Positive space can be created by Roto Artist within the footage to place an object which is not picturized. Suppose a character is picturised with a clear sky, and you want to insert clouds behind him or the area outside the car window needs to be colour corrected. In both situations, you may require to perform roto between and behind shapes for which mattes in not required. In this situation you will find focus object, passing in front of the isolating object. In Figure 1.18 (a), you need to isolate the window but person is sitting in front of it. So you have to create two mattes as shown in Figure 1.18 (b) and (c).

Fig. 1.18(a) Original Footage

Fig. 1.18 (b) Windows matte including person **Fig. 1.18 (c) Person Matte**

To signal out the area of focus object, remove the man matte from window matte as shown in Figure 1.19.

Windows Matte - Man Matte = Final Matte

Fig. 1.19: Final matte after removing man matte from windows matte

9. Motion Path

Motion path refers to a shape taken while moving with focus object. After breaking down the focus object into shapes, you need to find motion paths of these shapes. Motion is defined by using key frames. Key frames are set on the stopping point of the object or in changing direction. Motion and animation for the key-frames is calculated by using this technique.

Fig. 1.20 Motion path showing in red line

Defining a movement means establishing the focus object from starting point to end point. Setting up the key frames suggest that the object is in these two positions at these two points in the timeline. The computer assumes the position data between these two points and moves the spline/shapes appropriately.

Check Your Progress

A. Multiple Choice Questions

1. Which of the following is not decided before rotoscoping (a) Motion Path (b) Positive space (c) Shot Length (d) Negative space
2. Which of the following object is going to isolate from a frame is (a) Main (b) Sub (c) Focus (d) Image
3. Matte refers to (a) Layer of an image (b) Colour image that tells software about colour channel (c) Black and white frame that tells software what is visible (d) Image format

4. Shaky video footage cannot stabilized in (a) Adobe Premiere pro Software (b) Adobe after Effects Software (c) Final cut pro (d) Adobe Audition
5. Style frame is a snapshot of (a) Finished frame (b) Final edited frame (c) Original video frame (d) Raw footage
6. A Roto-artist watches the frame in the form of (a) Shape (b) Edge (c) Layer (d) Shape and Edge
7. Which of the following shows the perfection in roto object (a) Shape (b) Focus object (c) Edge (d) Motion Path
8. Rotoscoping should be started from (a) First Frame (b) The frame which has details of object (c) The frame which has detail and complete shape of object (d) End frame
9. For effective rotoscoping effortlessly, focus object should be break down in (a) Single shape (b) Two shapes (c) Multiple shapes (d) Open shape
10. Motion path refers to (a) Movement of all objects within frame (b) Routes of an object (c) Routes a shape takes while moving within a shot (d) Routes of background object

B. Fill in the blanks

1. Rotoscoping requires_____ and _____.
2. In a matte, White is _____ while black is_____.
3. In Adobe Premiere software, _____ is used to stabilize the footage.
4. The next step after identifying the focus object is _____.
5. Shape helps roto-artist to easily distinguish and isolate_____.
6. Edge shows the _____ in roto object.
7. Creating _____ is inefficient way of roto.
8. It is easy to manage rotoscoping by breaking down the focus object into _____ (multiple shapes)
9. Motion path refers to a _____ taken while moving with focus object. (shape)
10. Defining a movement means establishing the focus object from _____ point to point (starting, end).

C. True or False

1. The shot length is important aspect in rotoscoping.
2. It is essential to understand matte use in rotoscoping.
3. Edge is technically the most important element in rotoscoping.
4. Edge feather should be used on every shape.
5. Key frames are generally set on the stopping points or direction changes.

D. Short answer questions

1. Why the shot length is important factor in rotoscoping?
2. What is Focus object and matte?
3. What is style frame?
4. Differentiate between Edge and Shape.
5. How the style frame helps to understand matte usages?
6. Write the importance of edge and shape in rotoscoping.
7. What are the benefits of breaking down an object in multiple shapes?
8. What is positive space?
9. What is motion path?

Session 2: Working with Silhouette Software

Rotoscoping can be performed traditionally as well as digitally on computer. Digital Rotoscoping is much faster than the traditional. Digital roto artist can do the work eight times faster than the traditional rotoscoping within one fourth of time. In traditional rotoscoping each frame has to be drawn individually, while in digital rotoscoping, roto artist can use the previous frame as a basis which minimises the work of roto artist.

Digital rotoscoping is now empowered by various rotoscoping software like Adobe After Effects©, Nuke© and SilhouetteFX©.

In this chapter, you will be able to perform hands on of SilhouetteFX© software developed by Boris FX. (Figure 2.1) It is specially designed software for Rotoscoping and Paint. The top most artists and most famous Visual Effects studios such as Weta Digital, Frame-store, Technicolour, Deluxe, and many more use Silhouette software for creating epic visual effects on the biggest blockbuster film including Avatar, The Hobbit, Wonder Woman, Avengers: End Game, and Fast & Furious Presents: Hobbs & Shaw.

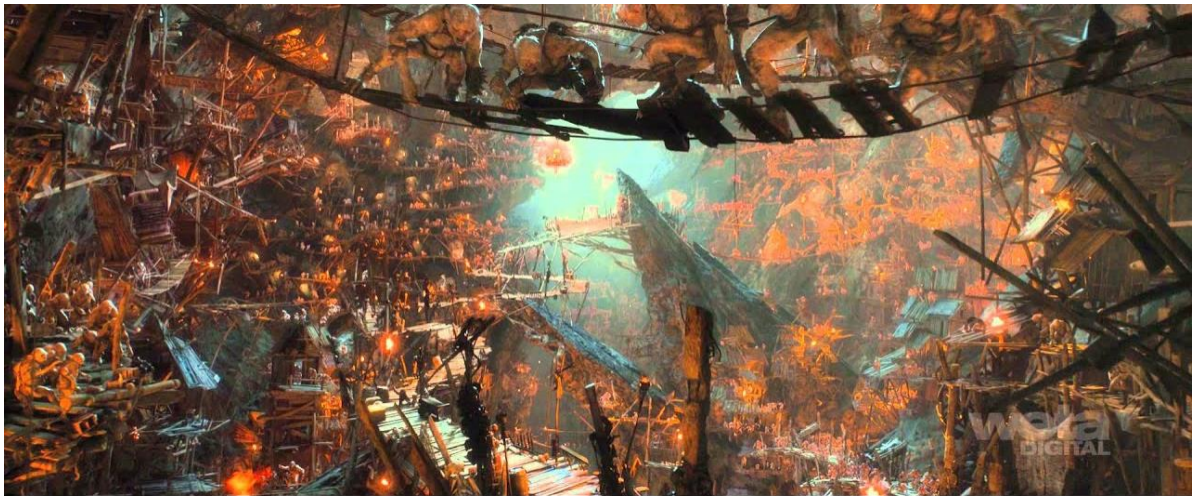


Fig. 2.1 Visual Effect scene from movie 'The Hobbit' Courtesy-Weta Digital

It is exciting to know that SilhouetteFX© is developed by Hollywood post production houses. The team behind Digital Film Tools discovered that the looks and effects they wanted as artists just did not exist. So, they decided to write new custom tools for themselves and the rest is history. Featuring over 100 filters and thousands of pre-set including color grading pre-sets inspired by Academy Award-winning films like 2001: A Space Odyssey, Apocalypse Now, Blade Runner, back to the Future, and Gone with the Wind.

2.1 SilhouetteFX© Overview

SilhouetteFX© is hard core, streamlined rotoscoping software, which can be leaned easily by the roto artist. It was designed purely for Roto and Paint. Its interface and workflow provide optimal situation in which element can be isolated quickly.

In this software, you get an excellent non-uniform scale. It allows adjusting a section of a shape without altering other accurate edge sections. Silhouette also has useful keyboard shortcuts that make it very easy to view your shapes, a shaded area of your shapes over the footage i.e. coloured overlay, and the alpha channel of shapes.

The software also empowered with useful tracker such as point tracker and planar tracker. It requires little input from the user and rest it tracks automatically. You can pre-process the tracker by using pre-processing options like blur, sharpness, contrast and noise. SilhouetteFX© also comes with some light compositing tools. Its main function is Roto and paint. Its features are simple, straightforward and easy to use for Roto.

2.2 User interface

SilhouetteFX© interface is made up of traditional pull-down menus, toolbars and pop-up menus. Here, you will get quick shortcut keys for all the function and most of the time; it is shown next to the menus or toolbar. When you drag cursor over any function or tools, then the function of the keys or menus are described. Mostly popup and floating windows are used as per requirement. (Figure 2.2)

The SilhouetteFX© interface is comprised of Sources, Trees, Viewer, Toolbar, Time bar, Timeline/Curve Editor, Node and Object Parameters, Presets, Object Lists and Nodes windows.

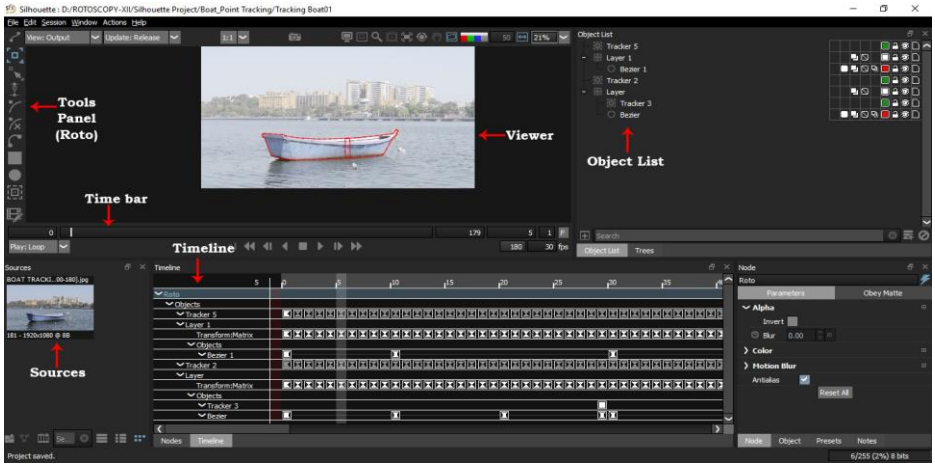


Fig. 2.2 User interface of SilhouetteFX© Software Courtesy-Author

2.2.1 Sources Window

The video clips are placed in Sources window, which is saved in the form of image sequence. (Figure 2.3) The location, frame rate, raster type, image size, and other information about the sources are stored for reference.

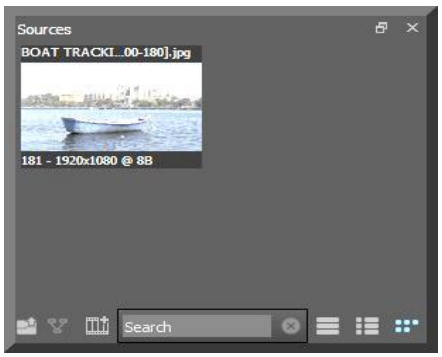


Fig. 2.3 Sources window Courtesy-Author

Practical Activity 2.1 – Create a Project in SilhouetteFX©v7.5 and import footage on sources Window.

Silhouette supports only the image sequence. So first convert your video in to the image sequence.

(a) Convert Video in to the Image sequence.

Step 1. You need video conversion or video editing software for converting video footage in image sequence. This time, we will use Adobe Premiere Pro© video editing software. Open Adobe Premiere Pro© software by clicking on desktop icon or from start menu. (Figure 2.4)

Fig. 2.4 Welcome Screen of Adobe Premiere Pro© Courtesy-Adobe

Step 2. As the software initial screen opens, click on New project tab to create a new project as shown in Figure 2.5.

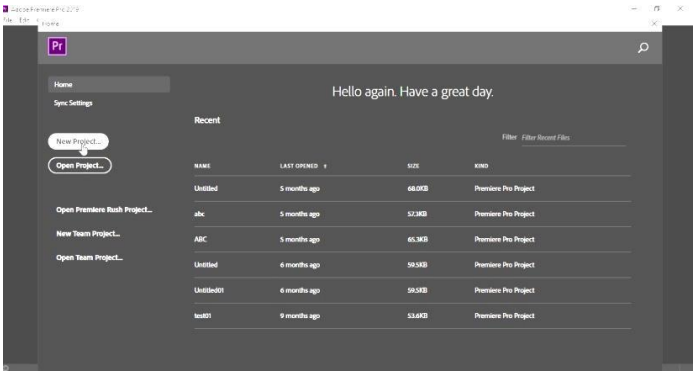


Fig. 2.5 Adobe Premiere pro Home Screen Courtesy-Author

Step 3. In New Project pop-up window, fill the required detail such as project name, location and general setting. Now click on **OK** button as shown in Figure 2.6.

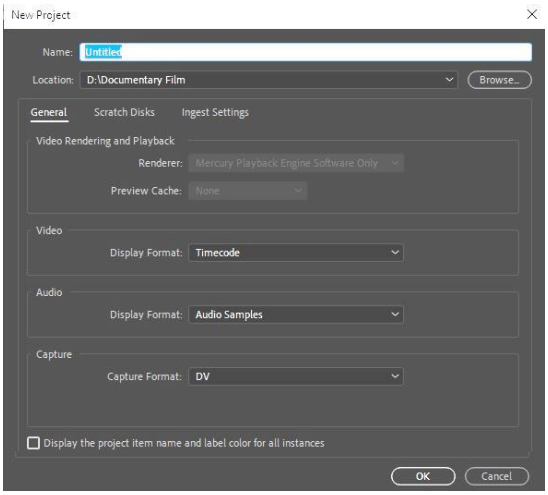


Fig. 2.6 New Project window Courtesy-Author

Step 4. Now Adobe Premiere Pro© software interface open as shown in Figure 2.7.

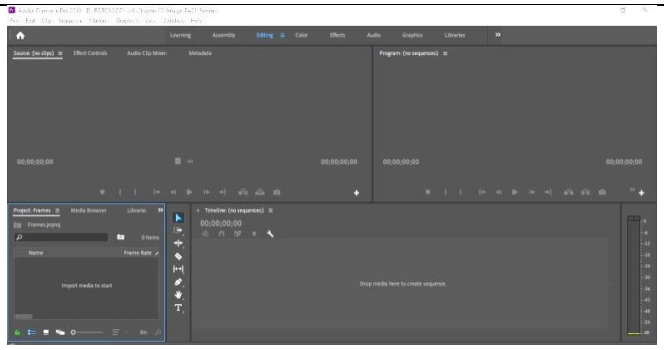


Fig. 2.7 Adobe Premiere Pro© interface Courtesy-Author

Step 5. Now you need to bring the video footage into the software for creating image sequence. So Select **File > Import**; and Import video footage in project panel as shown in Figure 2.8.

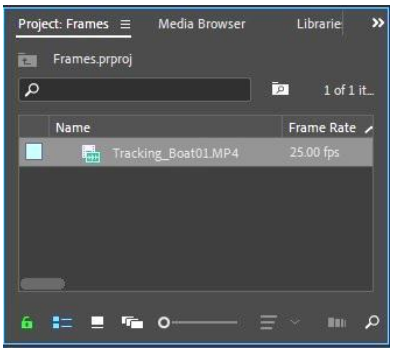


Fig. 2.8 Project Panel Courtesy-Author

Step 4. To convert this video, it needs to be put on the timeline. For this, go to the **File > New > Sequence** and Create a new sequence in timeline as shown in Figure 2.9.

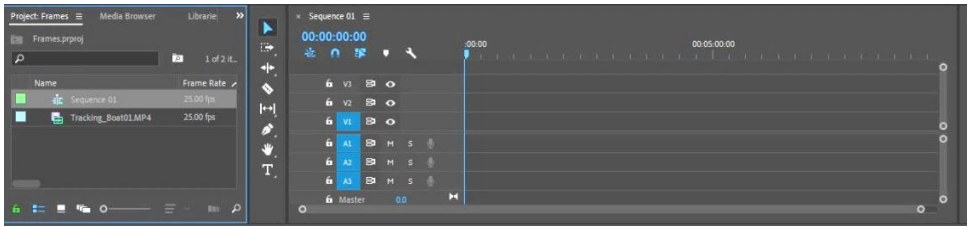


Fig. 2.9 New Sequence in timeline Courtesy-Author

Step 5. Drag and drop your footage into the timeline and mark 'IN' and 'OUT' to the footage as shown in Figure 2.10.

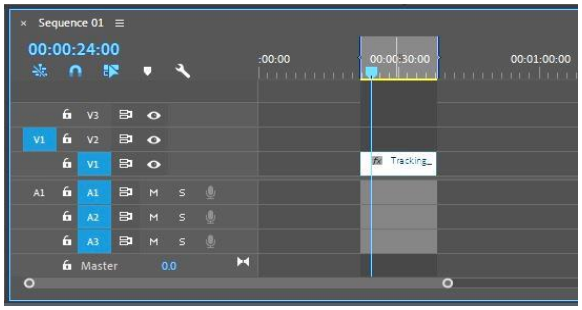


Fig. 2.10 Footage is inserted on timeline Courtesy-Author

Step 5. For creating Image sequence; Select **File> Export> Media.** Now the dialogue box opens. You can choose your export setting here. For creating image sequence from the video, select image format like jpeg and its image present. After that choose the

output name of the file and click on file name to browse the desired location. Once all is done click the Export button at the bottom of the window as shown in Figure 2.11.

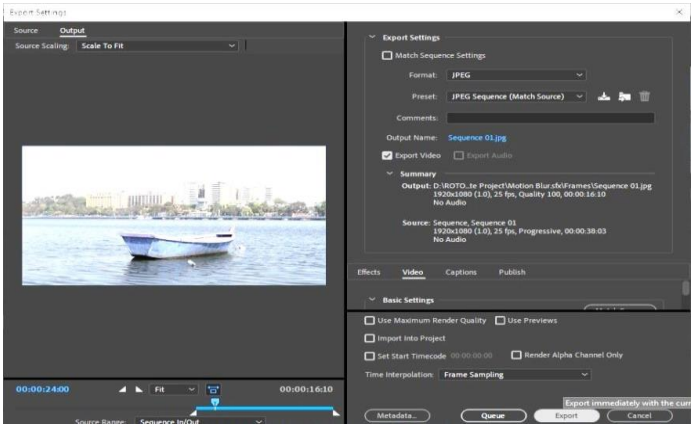


Fig. 2.11 File export setting Courtesy-Author

Step 6. The selected video has been converted in to the Image sequence and saved in to desired location as shown in Figure 2.12.

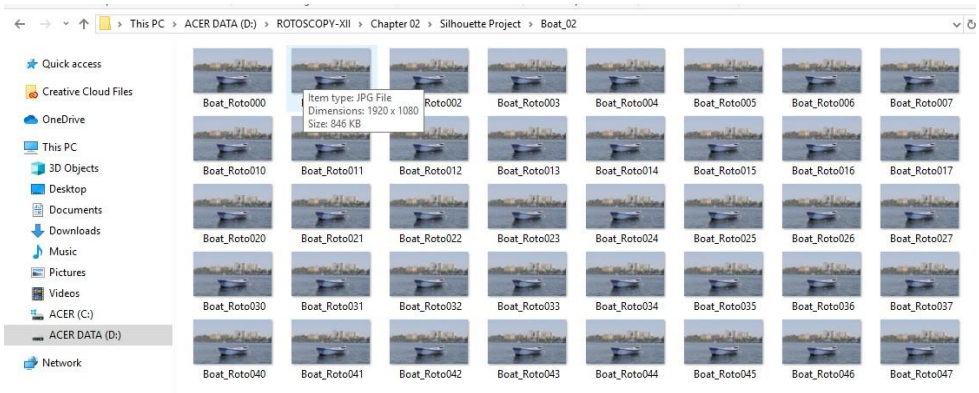


Fig. 2.12 Image Sequence Courtesy-Author

Now you need to import this Image Sequence in SilhouetteFX© Software.

(b) Create a project in Silhouette©v7.5 and Import the footage.

Step 1. To open the software under Windows 10 environment, Type Silhouette on search box and click on software link as shown in Figure 2.13.

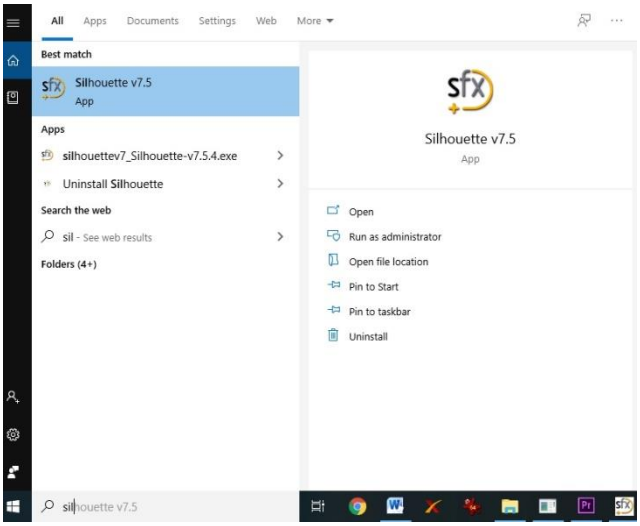


Fig. 2.13 Search the software Courtesy-SilhouetteFX

Step 2. Silhouette©v7.5 Welcome Screen appears. Here click on **New Project** as shown in Figure 2.14.

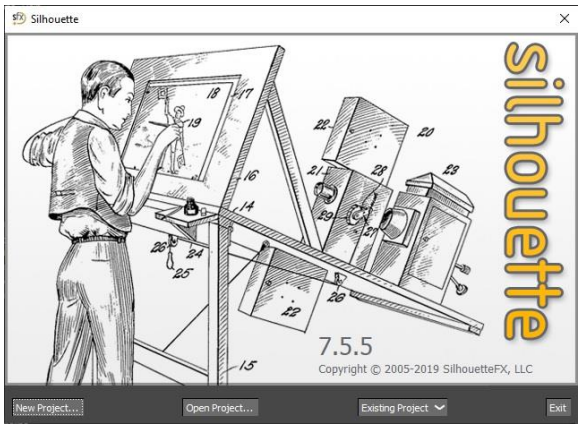


Fig. 2.14 SilhouetteFX©v7.5 Welcome Screen Courtesy-SilhouetteFX

Step 3. The **New Project** dialogue box opens. Enter the name of the Project and browse the destination folder to save the project. After this, click on **Create Project** as shown in Figure 2.15

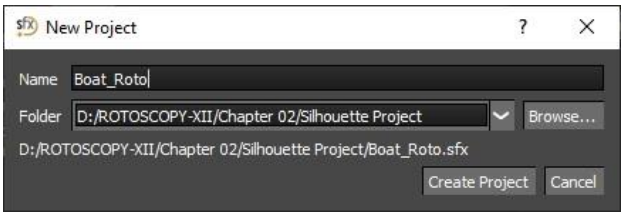


Fig. 2.15 New Project Dialog box Courtesy-Author

Step 4. After creating project, Silhouette© v7.5 interface opens as shown in Figure 2.16.

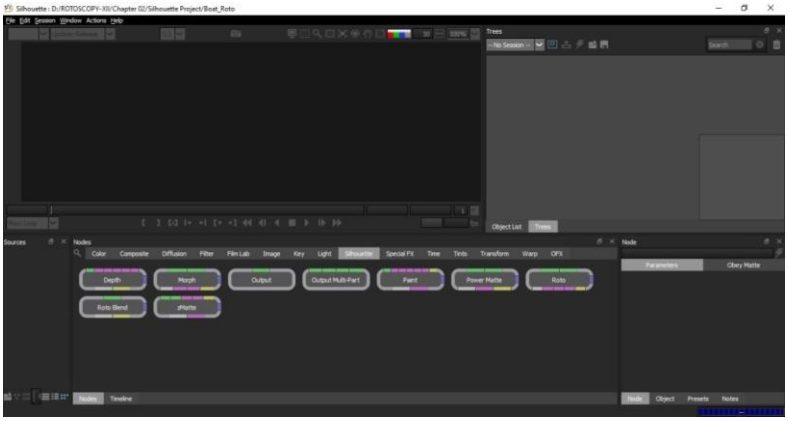


Fig. 2.16 SilhouetteFX© Interface Courtesy-Author

Step 5. To import, converted image sequences on Project, select **File >Import > Media** or click on import icon on **Sources** window as shown Figure 2.17 and Figure 2.18.

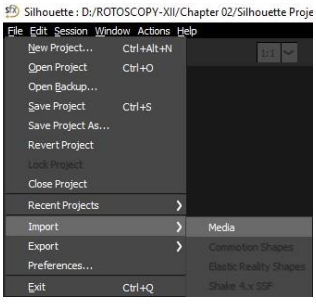


Fig. 2.17 Import footage Courtesy-Author

Fig. 2.18 Import icon on source window Courtesy-Author

Step 6. As you click on '**Import**', a dialogue box opens. Keep in mind that you need to select first frame and click on **Open** tab as shown in Figure 2.19.

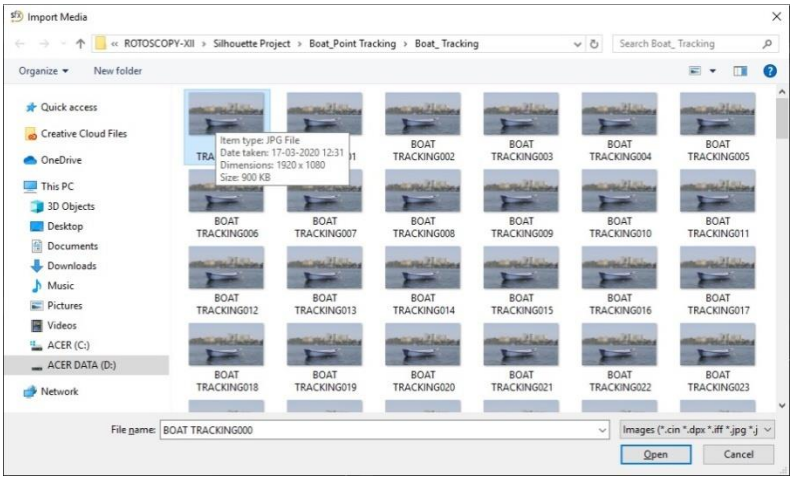


Fig. 2.19 Import Dialog box Courtesy-Author

Step 7. Now Video footage is imported in the form of Image sequence, which is placed in **Sources** window as shown in Figure 2.20.

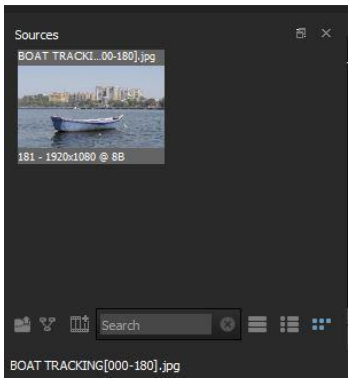


Fig. 2.20 Footage is imported on source window Courtesy-Author

Step 8. Thus, Footage is imported in Silhouette© v7.5, double click the Footage on **Sources** windows to playback it on **Viewer** Panel. In this way, you can import a video footage in Silhouette© software as shown in Figure 2.21.

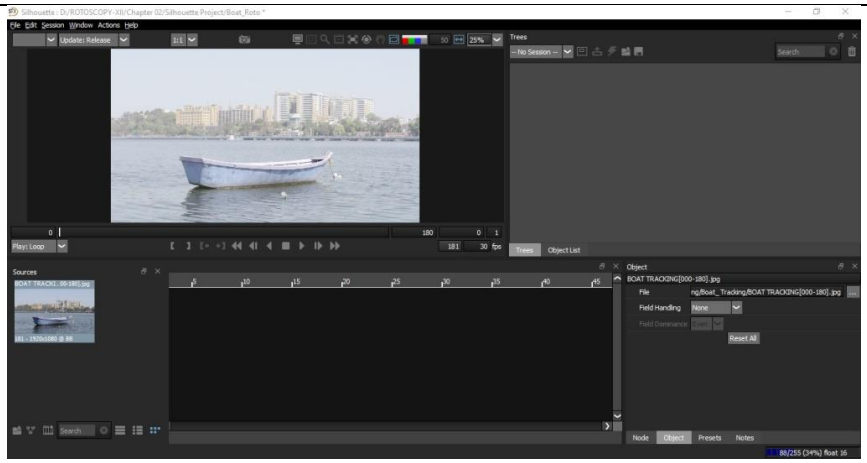


Fig. 2.21 Playback footage on viewer panel Courtesy-Author

Know More...

SilhouetteFX© Software does not support the video files. So you have to convert video files into the Image sequence by using software like Adobe Premiere or Adobe After Effects.

The Silhouette's supported image format includes – Cineon, DPX, IFF, JPEG, Open EXR, PNG, TGA, TIFF, SGI

2.2.2 Sessions

Once you import footage in silhouette, a session needs to be created for each video footage you will be working on. You could create as many sessions as you want, but can work only one session at once. Session is a place where you can roto, paint or composite as shown in Figure 2.22.

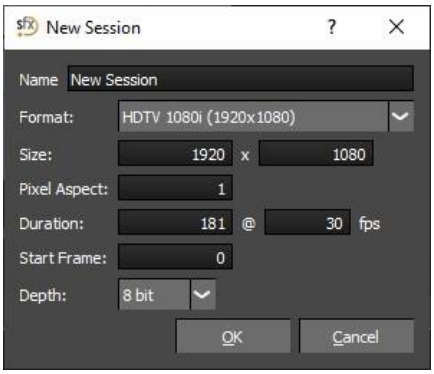


Fig. 2.22 New Session Courtesy-Author

It describes the Format, resolution, pixel aspect, duration in frames, frame rate and bit-depth. Let us create a session into the Silhouette© v7.5.5.

Practical Activity 2.2 – Create a session in Silhouette© v7.5.5 software.

Once you Import the footage on Sources window, you need to create session. Session can be created by two methods.

Method 1

Step 1. Select the video frames on sources window and go to **Session > new session**; a dialogue box opens. It automatically fill-up the setting details based on selected video property. If you want any change on session setting then change it manually. Write the session name and click on **OK** button as shown in Figure 2.23.

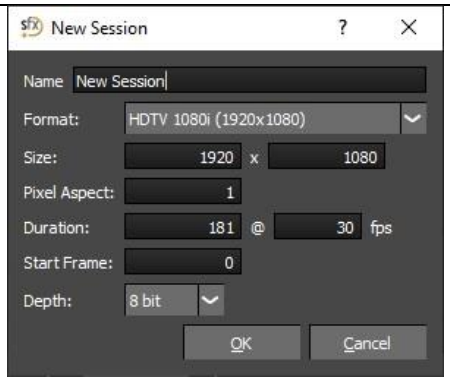


Fig. 2.23 New Session Dialog Box Courtesy-Author

Step 2. Now a new session is created on **Trees** window at the top right side of the software interface. In **Trees** window, initially you will get two nodes interconnected which are source and output node as shown in Figure 2.24.

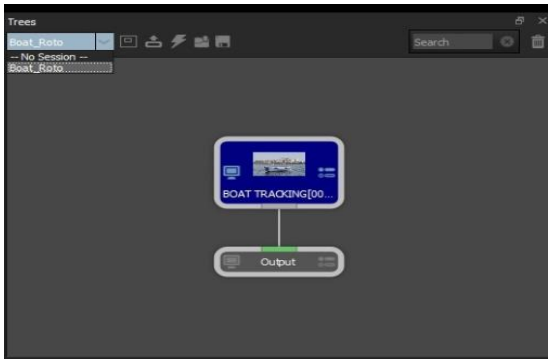


Fig. 2.24 Trees Window Courtesy-Author

Method 2

Step 1. In this method, drag and drop the image sequence (Video footage) from **sources** window to **trees** window by holding the left mouse button as shown in Figure 2.25.

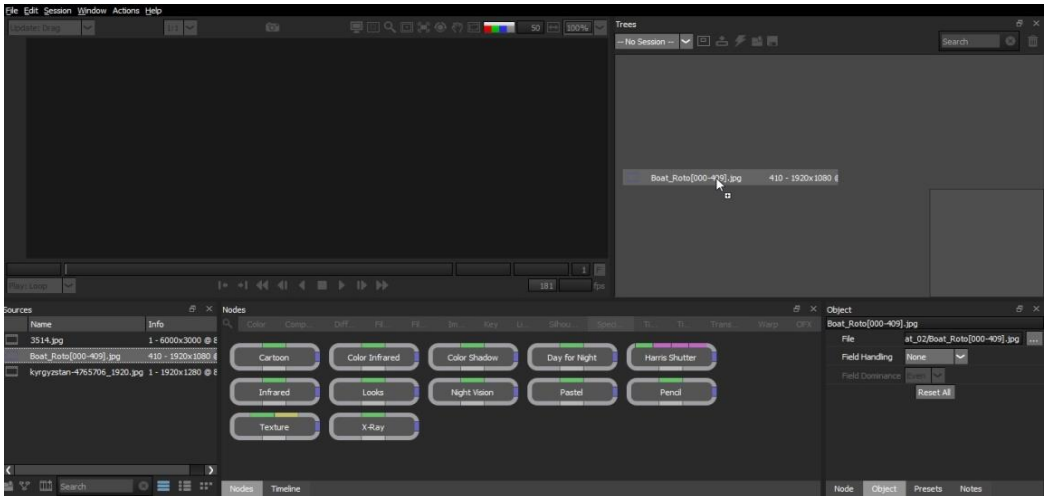


Fig. 2.25 Drag and drop image sequence from sources to trees window Courtesy-Author

Step 2. A new session dialogue box opens after releasing the mouse button. Here you can fill the detail as done in method 1 and click **OK** button as shown in Figure 2.26.

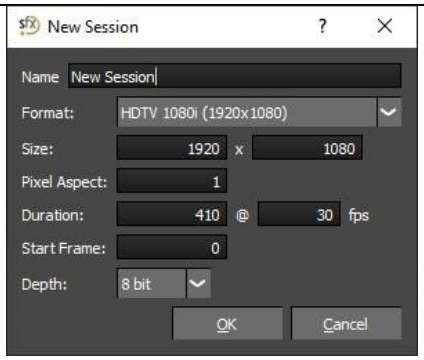


Fig. 2.26 Session Dialog Box Courtesy-Author

2.2.3 Trees

A Session is created in Trees Window. Trees are the combination of sources and nodes that are used to create the desired effect as shown in Figure 2.27.

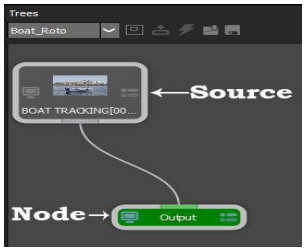


Fig. 2.27 Trees Courtesy-Author

2.2.4 Nodes

Node base software is handling complex compositing task by linking together several simple image processing operations. Each of these operations is referred to as a "node".

Individual nodes are connected together to form a tree. Nodes are grouped into the categories, such as, Color, Composite, Diffusion, Filter, Film Lab, Image, Key, Light, Silhouette, Special Effects, Time, Tints, Transform and Warp. There are more than 150 nodes in Silhouette©v7.5 software as shown in Figure 2.28.

Fig. 2.28 Nodes Courtesy-Author

In Figure 2.29, you can easily observe the different colour bars on the border of the nodes. Let us find out what they are?

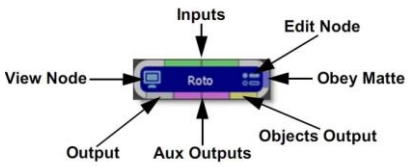


Fig. 2.29 Different colour bar on Roto node Courtesy-Author

Inputs

Green Colour bar on the top is the inputs. Depending on the node, the type of input required may change. Green bars are foreground and background inputs. Tool tips pop up when you hover over a node's input or output to easily identify it.

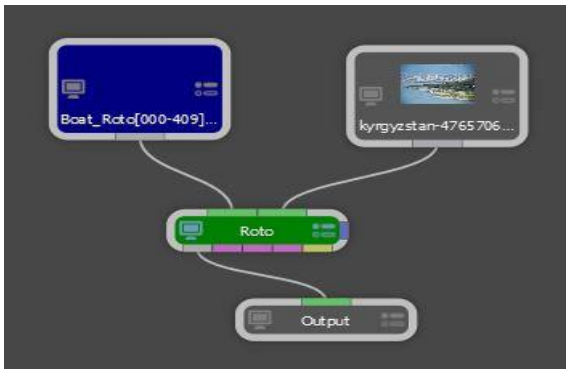


Fig. 2.30 Foreground and background connected with Roto nodes Courtesy-Author

You can check foreground and background in roto nodes. For this switch between foreground and background in viewer panel as shown in Figure 2.32 (a) and (b).

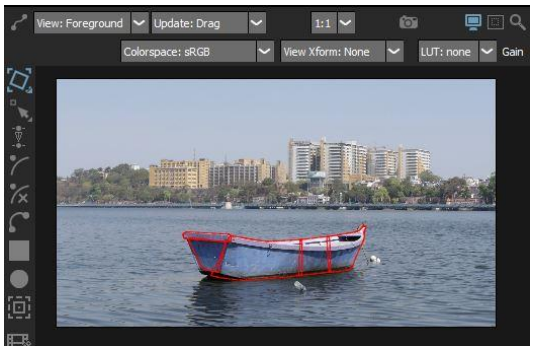


Fig. 2.31 (a) Foreground view

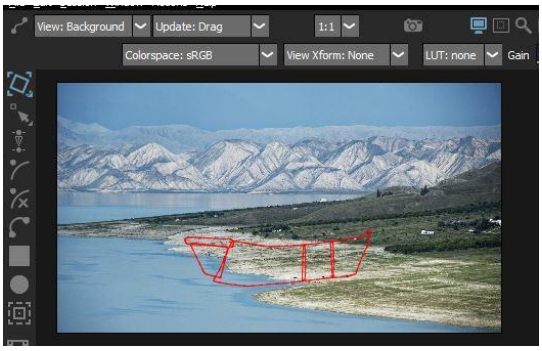


Fig. 2.32 (b) Background view

Output

The colour bars on the bottom of a node is outputs. The grey colour bar is the main output, purple bars are colour composite, composite and channel outputs respectively. Yellow bars are object outputs-like layers. You can use the output of a node to feed into the input of other nodes. It is shown in Figure 2.33 (a) – (d).

So we will connect different output node in succession and observe the result.

Fig. 2.33 (a) Main output node Courtesy-Author

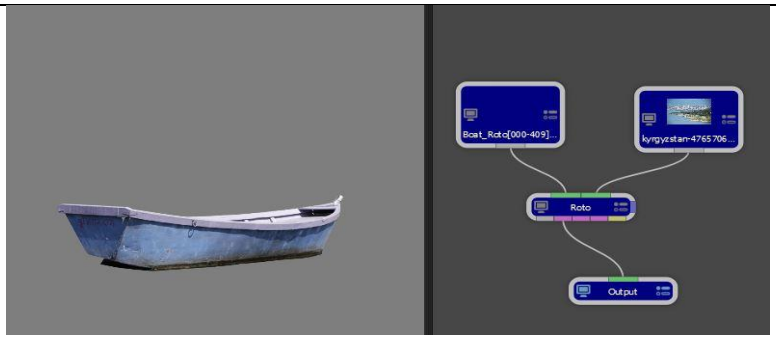


Fig. 2.33 (b) Colour composite output Courtesy-Author

Fig. 2.33 (c) Composite output Courtesy-Author

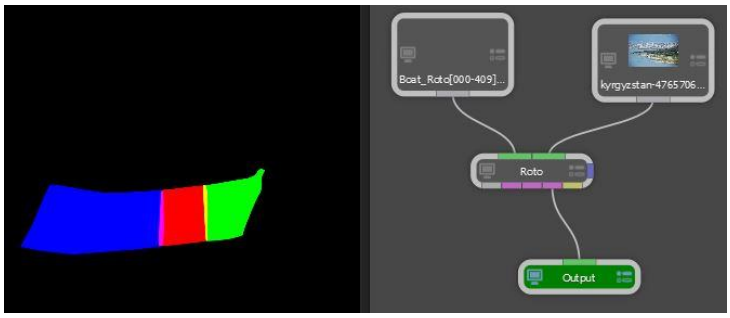


Fig. 2.33 (d) Channel output Courtesy-Author

Obey Matte

Obey Matte input as shown by blue colour bar at the far right. Obey matte works as a mask. Whatever is plugged in to Obey Matte input will constrain or limit the effect of the node. So, let's understand the impact of obey matte with the following example.

Step 1. Insert a double fog node between source and output in tree window as shown in Figure 2.34.

Fig. 2.34 Node Insertion Courtesy-Author

Step 2. Now connect the colour composite output from roto node with Obey Matte as shown in the Figure 2.35. The already done roto of boat shape will be explained in forthcoming chapter. You will observe no change yet in viewer's panel.

Fig. 2.35 Connect roto node with obey matte Courtesy-Author

Step 3. Now centre click on **double fog** node. Now Node parameter opens at bottom right corner as shown in Figure 2.36 (a) & (b). Here Right check in obey matte under node parameter. Watch the result on viewer's panel.

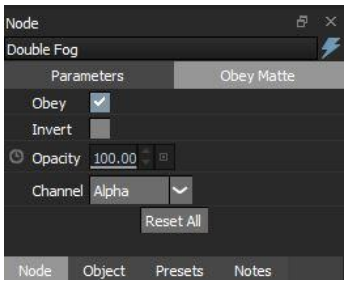


Fig. 2.36 (a) Obey matte option in node Parameter Courtesy-Author

Fig. 2.37 (b) Final result in Viewer's panel Courtesy-Author

View Node

When enabled the View Node icon on the left side of the node. It displays the result of that node in the Viewer.

Edit Node

When enabled, the Edit Node icon on the right side of the node. It displays parameters in the Node parameter window. It is shown in Figure 2.38.

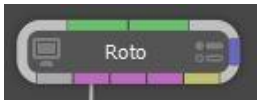


Fig. 2.38 Viewer and Edit Node Courtesy-Author

Table 2.1, shows the various Node category, their types, colour and specific work.

Table 2.1 Details of Roto Nodes

Node Category	Types	Colour	Work
Input	Foreground	Green	Connects the source video with foreground.
	Background	Green	Connects the background which place

			behind the extracted foreground object.
Output	Main Output	Grey	It is main output.
	Colour Composite	Purple	It shows the extract object in colour.
	Composite	Purple	It shows the combine output with foreground and background.
	Channel	Purple	If shows colour channel's output.
	Object output	Yellow	Nodes that contain trackers, like Depth, Morph and Roto have an Objects output that can be plugged into another node's Transform input.
Obey Matte		Blue	Constraints or limit the effect of nodes.

Know More...

When you insert a still frame in background node, always click on extend duration in node parameter otherwise it will show only the first frame and remain will be blanked. (Figure 2.39)

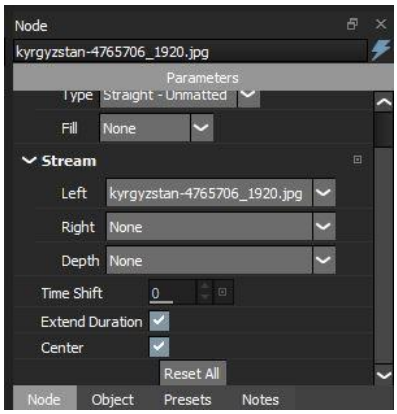


Fig. 2.39 Check on Extended Duration Courtesy-Author

Practical Activity 2.3 – Connect Roto Node between Source and output in tree window.

To insert Roto node between source and output, perform the following steps.

Step 1. Search Roto node in **Nodes** window as shown in Figure 2.40.

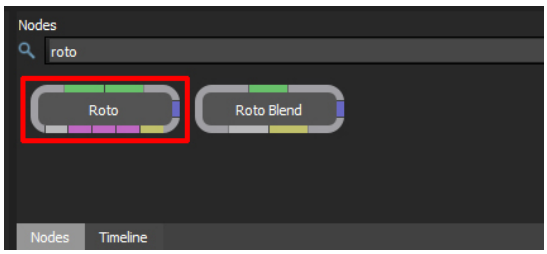


Fig. 2.40 Search Roto Node Courtesy-Author

Step 2. Click and Drag Roto nodes to Trees window and drop it on to the existing node wire between source and output as shown in Figure 2.41.

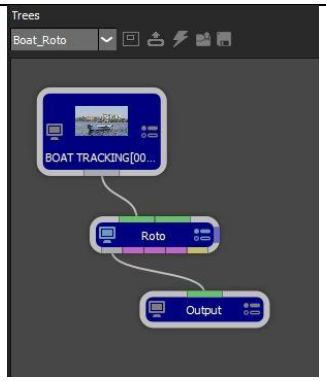


Fig. 2.41 Nodes connected in tree window Courtesy-Author

Now you can observe that Roto node is automatically connected. Here Source (Boat tracking) is connected with **input** and output is connected with **output** connection.

2.2.5 Object and Object List

After connecting the Roto node with source and output, you need shapes, layers and trackers to roto the object. Clicking on Roto node, the panels open as shown in Figure 2.42 will open.

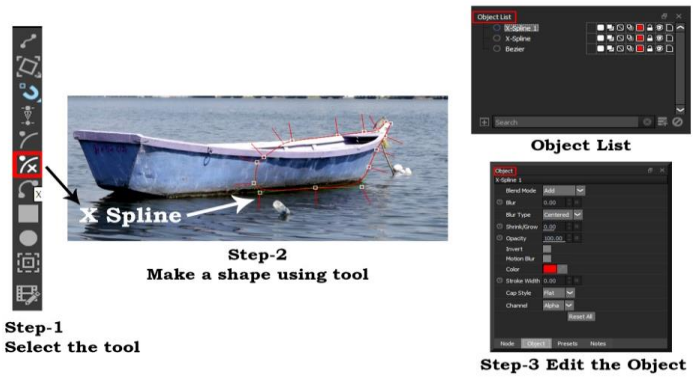


Fig. 2.42 Object and Object list Courtesy-Author

Tools Panel – It helps in creating different shapes and tracker.

Object list – It shows the list of shapes, layers and trackers. With the help of object list you can select, lock, combine, rename and delete the shape, layer and tracker.

Object – It shows the parameters/properties of the object.

By observing the object list carefully, you will find that some of the icons are on the right side, as shown in Figure 2.43.

Fig. 2.43 Object list Courtesy-Author

Object list icon is divided in two segments.

Layer Icon – It is used to modify layers as shown in Figure 2.44 (a).

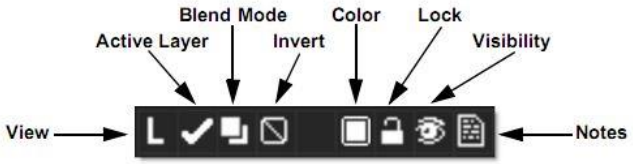


Fig. 2.44 (a) Layer Icon Courtesy-SilhouetteFX

Shape icon – It is used to modify shape as shown in Figure 2.44 (b).

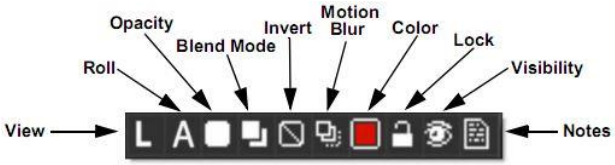


Fig. 2.44 (b) Shape's Icon Courtesy-SilhouetteFX

Observe the layer and shape icons, most of them are similar. Table 2.2 shows list of icons.

Table 2.2 Layer/Shape icon with its function

Layer/Shape icon	**Function**
View	It only shows up when using stereo source. It displays L for left view and R for right view.
Active layer	The active layer box displays a check mark when the layer is selected.
Roll	It only appears when using the morph node.
Opacity	It indicates the opacity level of the shape. It displays white when the opacity is 100%, black for 0% and shade of ray when opacity is in between.
Blend Mode	It shows how the shapes are blended with other shapes.
Invert	It inverts the shape.
Motion blur	It turns motion blur on or off for selected shape.
Colour	Change the outline colour of selected shape.
Lock	Lock/unlock the selected layer.
Visibility	Hide or show selected layer by click on visibility icon.
Notes	You can type a note for selected object.

Table 2.3 Object list shortcuts

Shortcut	**action**
Click on an object	Selects the object
Shift-click an object	Adds an object to the current selection
Ctrl(Win)/Cmd(Mac)-	Toggles the object selection

click on an object	
Shift-click color pot	Selects shapes of same color
Alt-click the Visibility icon	Solos an object
Alt-Ctrl-click the Visibility icon	Forces the visibility of all objects to the on position
Shift-click the +/- icon	Expands or collapses all nested layers inside that layer
Double-click an object	Selects the object so it can be renamed

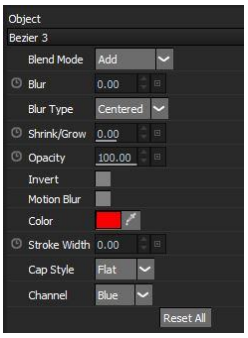


Fig. 2.45 Object window Courtesy-Author

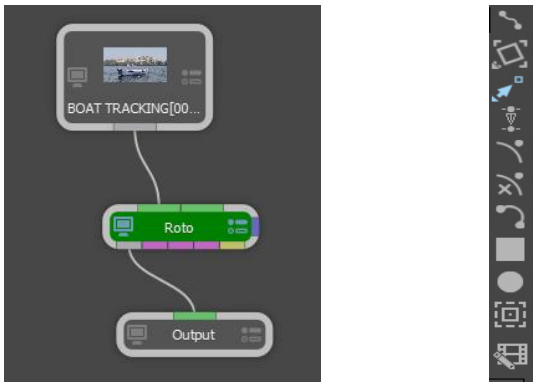
To change shape/object parameter then you should watch the **object** window, as shown in Figure 2.45. Here most of the option is similar to the object list icon. You can change this parameter either from object list icon or from object window. Table 2.4 mentions some parameters which are not included in the object list.

Table 2.4 Shape/object parameter

Shape/object parameter	**Function**
Blur	Apply blur over the shape.
Blur type	Set the blur type- centre, inner or outer.
Shrink/Grow	Shrink or grow the matte. Negative value shrinks while positive value grows the matte.
Stroke width	It is used to set the thickness of the open shape.
Cap style	It is used in open shape. You can keep your shape's corner flat or rounded.
Channel	You can assign channel like red, green, blue and alpha to the shape.

Know More...

In Silhouette©v7.5, Every node has different tool panel which enables as you click on that node Such as we click on Roto node, its tool panel enables. (Figure 2.46)



Roto Node **Tool Panel**

Fig. 2.46 Roto node and it's tools Courtesy-Author

2.2.6 Viewer and Time bar

In Viewer, you can watch the frame and manipulate it using various tools. Here by using time bar, you can reach at any frame or playback frame as shown in Figure 2.47.

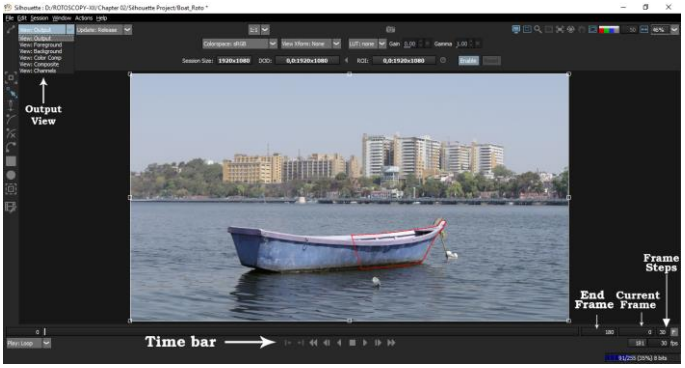


Fig. 2.47 Viewer and Time bar Courtesy-Author

Important controls in viewer's panel

Output View – In output view, you are able to see various outputs like – foreground, background, colour comp, components and channels, as shown in Figure 2.48.

Update – It shows the update in viewer's panel when you perform any change in node parameter. It has four options – Drag, adaptive, release and manual.

Selecting Drag update automatically displays the change in viewer panel. Set the update to manual mode and hit the enter key, if you want to see the changes when you want.

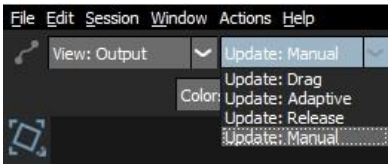


Fig. 2.48 Update option Courtesy-Author

Proxy Size – You can use a lower quality proxy image by using proxy pull down menu above the viewer. It helps you to speed up the processing of the system as shown in Figure 2.49 and Figure 2.50.

Fig. 2.49 Proxy Size 1:1 (Original Quality) Courtesy-Author

Fig. 2.50 Proxy Size 4:1 (Lowest Quality) Courtesy-Author

ROI (Region of Interest)

It crops the image in the viewer to a user defined size and can be animated. This is useful when you only need to animate within a smaller region of a larger image as it will use less memory and process faster. If expanded, the ROI will display over scan pixels which can then be manipulated.

End Frame – It shows the last frame number.

Current Frame – It displays the current frame number.

Frame Step – It skips the number of frames in playback, which you selected here. Suppose you have selected 30 frames then it shows frame like 0, 30, 60 etc. It's an important tool which helps you to move with specific frame interval.

Know More...

Frame Step is used for animating roto shape. You can set number of frames which you want to skip. The keyboard shortcut for frame step is page-up and page-down.

Table 2.5 Viewer keyboard Shortcut

Keyboard Shortcut	Actions

F1	Only the Viewer is shown in the interface.
F2	Only the Viewer and Timeline are shown in the interface
0	Toggles the display of overlays which are lines, shapes or objects
1-7 (Number Keys)	Switches the Viewer > View menu
~	Cycles through the update modes
A	Cycles the display between the full color image, the alpha channel
Shift +A	superimposed over the image, and the alpha channel by itself
Alt-R/G/B/A	Toggles the red, green, blue and alpha channels ON & OFF
Alt-0	Toggles the display to/from the Output node's alpha channel from any other node. Pressing Alt-O again views the previous node.
Shift-Ctrl-R	Toggles the Viewer rotation mode ON/OFF
Shift-R	Toggles the Viewer rotation editing mode ON/OFF

Summary

SilhouetteFX© is node base software.

SilhouetteFX© interface and workflow creates ideal situation in which an element can be quickly isolated from videos.

The SilhouetteFX© interface is comprised of Sources, Trees, Viewers, Toolbar, Time bar, Timeline/Curve Editor, Node and Object Parameters, Presets, Object Lists and Nodes windows.

In SilhouetteFX© software, you can work on a single session at a time.

All the nodes are connected into trees window.

Each node includes simple image processing operations.

Roto node is specifically made for rotoscoping work.

You can create multiple shapes in roto nodes.

Object shows the parameters/properties of the object/shape.

Object list shows the list of shapes, layers and trackers.

Check Your Progress

A. Multiple Choice Questions

1. SilhouetteFX was designed purely for_____(a) Roto (b) Paint (c) Roto and Paint (d) Compositing
2. Which are located in Source window (a) Effects (b) Nodes (c) Still image sequence (d) Video file
3. SilhouetteFX does not support _____ image format (a) Cineon (b) DPX (c) JPEG (d) BMP

4. You can work in_____ session at once. (a) One (b) Two (c) Three (d) Four
5. You cannot select _____ in session setting. (a) Format (b) Resolution (c) Depth (d) Aspect Ratio
6. Trees are the combination of_____. (a) Sources and Output (b) Sources and Roto (c) Sources and Nodes (d) Nodes and output
7. Nodes are grouped in ____ category. (a) 14 (b) 15 (c) 16 (d) 17
8. Green colour bar on the top of any node are_____(a) View Node (b) Input (c) Output (d) Obey matte
9. The gray colour bar on the bottom of the node is _____ (a) Main Output (b) Aux Output (c) Objects output (d) Channel output
10. Which is not included in object list (a) Shapes (b) Layers (c) Trackers (d) Nodes

B. Fill in the blanks

1. SilhouetteFX uses a combination of traditional pull-down menus, _____and _____.
2. SilhouetteFX supports only the_____.
3. After importing the footage on source window, you need to create_____.
4. Roto node included in _____ category.
5. Obey matte works as a _____.
6. Edit node displays parameters in the _____ window.
7. You can select, lock, _____, rename and _____ the shape, layer and tracker in object list.
8. If update mode is set in 'manual' then you need to hit_____ key to see changes in viewer's panel.
9. ROI _____ the image in the viewer.
10. Frame Steps skips the no. of frame in _____.

C. True or False

1. You can import video file in silhouette software.
2. You need to create a session for each video footage.
3. Individual nodes that perform image processing functions are connected together to form an object.
4. Foreground and background come under inputs.
5. You can use the output of a node to feed it into the input of other nodes.
6. The blue colour bar at the far right is the Obey matte input.
7. View node displays the result of the node in node parameter.
8. In roto node, tools panel helps in creating different shapes and trackers.
9. Object shows the list of shapes.
10. Stroke width is used to set the thickness of the open shape.

D. Answer in short

1. What is SilhouetteFX software?
2. Create a diagram of SilhouetteFX user interface.
3. How to create session?
4. Writes the name of different nodes included in SilhouetteFX category.
5. What are the different output nodes?
6. What are view node and edit node?
7. Explain object and object list?
8. What is different layer and shape icons?
9. Write the use of viewer and time bar?
10. What is ROI?

Session 3: Drawing Shapes

You can create anything by using a Magic pencil. It is a story of famous serial 'Shaka laka boom boom' as shown in Figure 3.1. The story revolves around the central character Sanju finding a magical pencil, which has the ability to bring things drawn with it to life.

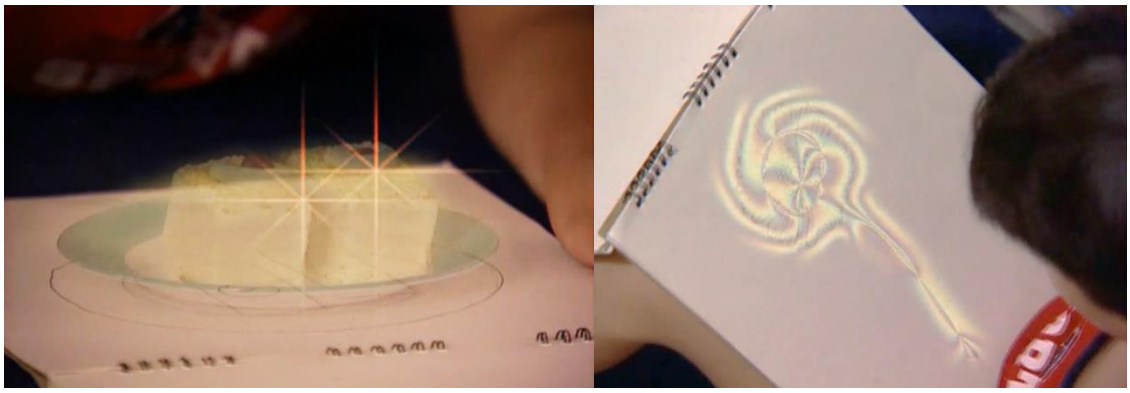


Fig. 3.1 Stills from serial 'Shaka Laka Boom Boom' Courtesy-UTV Software comm.

It is a fiction story; we don't have this kind of magic pen in reality. But you can find various pen or spline tool in SilhouetteFX© software that helps you to extract the focus object from the video footage.

This spline or pen creates shapes same as magical pen. Before you begin to create shapes from splines, let us resolve some thoughts which may come in your mind later.

Need of creating shapes for rotoscoping

Shape creates alpha matte. It is a black-and-white frame or set of frames that tells the program what is visible and what is not. In matte, white color is visible and black is not visible. Gray areas are partially visible depending on their numerical position between 1 and 0. Compositors use the Alpha matte to isolate areas within the comp. Observe three pictures shown in Figure 3.2 (a), (b), (c).

Fig. 3.2 (a) Original Footage Courtesy-Pixabay.com

Fig. 3.2 (b) Create Alpha Matte in SilhouetteFX© Courtesy-Author

Fig. 3.2 (c) Final Composite Courtesy-Author

Observe that the black and white area in Figure 3.2 (b). The black colour represents transparent area and white colour represents solid area. So, in Figure 3.2 (c) transparent black area is replaced by background while the solid white area is not replaced. Compare Figure 3.2 (a) and Figure 3.2 (c), and identify the area which is replaced in final composite. You need pen tool or spline to create the picture shown in Figure 3.2 (b), which is Alpha mate.

3.1 Tools

Spline is probably most important tools for creating roto shape which you can get in tools panel. As you click on Roto nodes, Tools panel appears Left side of Silhouette©FX software interface. Tools are designed for rotoscoping and it helps to draw the shapes.

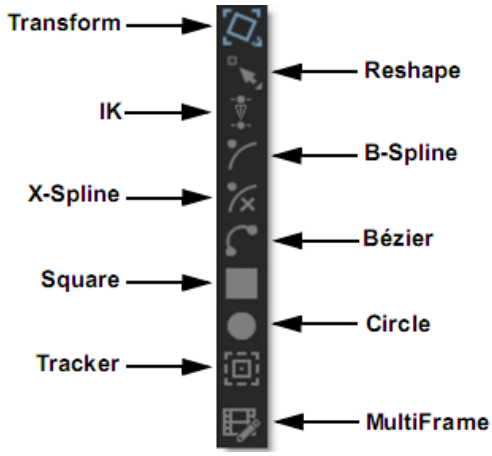


Fig. 3.3 Rotoscoping Tools Courtesy-SilhouetteFX

This tool panel is classified in three categories.

Drawing Tools – B spline, X spline, Bezier, Square, Circle and Reshape.

1. **Animating Tools –** Transform and IK (Inverse Kinematics), Reshape.

2. **Tracker –** It creates path for animating shapes.

In SilhouetteFX© the drawing tools are commonly known as Shape type.

3.1 Shape Types

3.1.1 Bezier

It is the oldest tool such as **Pen** tool in Adobe Photoshop©. Bezier splines are defined by control points and tangents. To control Bezier, you have to control two things.

1. Control point for position
2. Tangent or Handle for curvature

Control Point **Tangent or Handle**

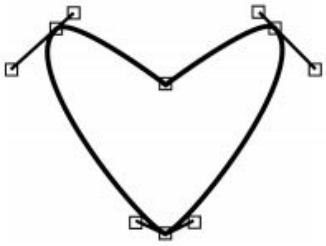
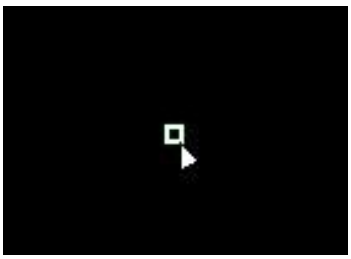
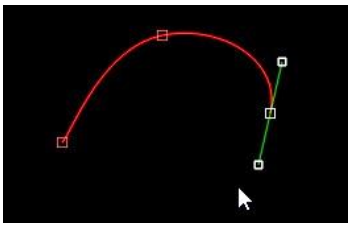
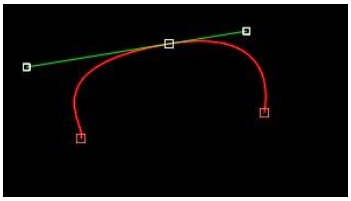
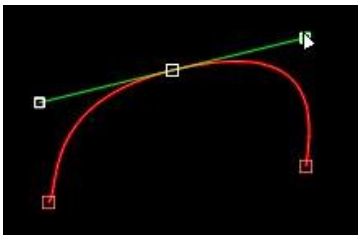
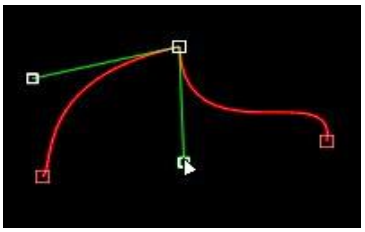


Fig. 3.4 Bezier tool Courtesy-SilhouetteFX

Table 3.1 Adjusting Bezier Curve

Mouse/ keyboard Control	Action	Curve
Left click on screen	Place First Control point	
Hold down left click	Curvature appears	
Click and drag tangent handle	Adjust the length of one tangent while retaining fix angle between tangents.	

Ctrl+ drag a tangent	Adjust both tangents simultaneously while retaining fix angle between tangents.	
Alt+ drag a tangent	Only one tangent is move which is good for creating corner	

Adjust Bezier curve tension

Right clicking the mouse button on any control point shows the four adjustments.

- Linear – Linear adjusts both tangents one quarter the distance and in the direction of their adjoining control points.
- Corner – It collapses both tangent points.
- Cardinal – Creates smooth point whether the curve passes smoothly.

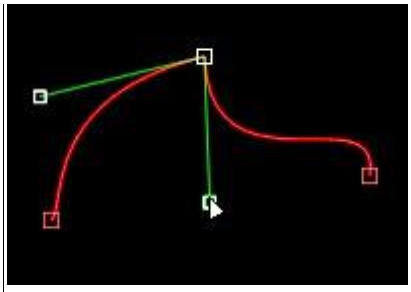


Fig. 3.5 (a) Original Curve

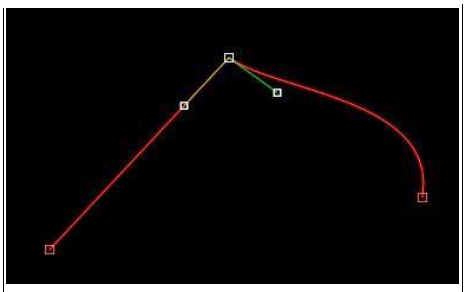


Fig. 3.5 (b) Linear

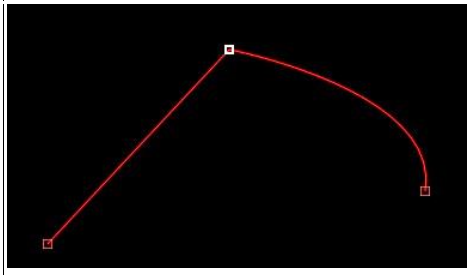


Fig. 3.5 (c) Corner

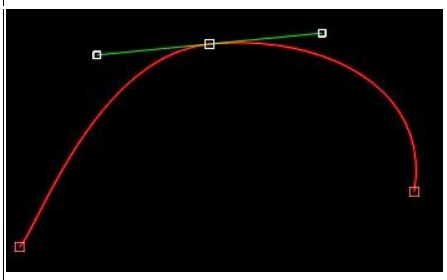


Fig. 3.5 (d) Cardinal

Practical Activity 3.1 – Create a shape over the focus object using Bezier tool.

Step 1. As you select roto node in **Tree** window, Bezier tool appears on toolbar. Select Bezier (Shift+B)  .

Step 2. Click on the image to place the first control point. The starting control point is created and sets the direction of the shape's path as shown in Figure 3.6.

Fig. 3.6 Create First Control Point Courtesy-Pixabay.com

Step 3. To extend the control point's tangents, drag the cursor while keeping the mouse pressed as shown in Figure 3.7.

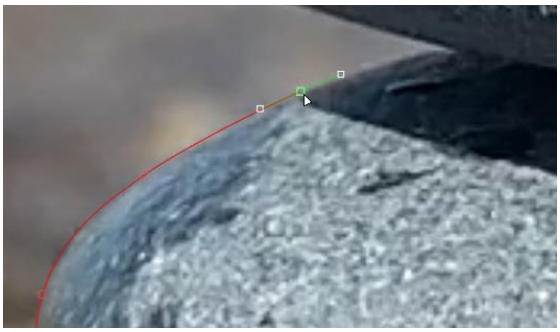


Fig. 3.7 Drag the Cursor to create Curve Courtesy-Author

Step 4. Click on the screen to add more control points as shown in Figure 3.8.

Fig. 3.8 Add more Control Point Courtesy-Author

Step 5. When finished adding points, click the first control point that you added to close the shape as shown in Figure 3.9 and Figure 3.10.

Fig. 3.9 Click the first point to connect it with end point Courtesy-Author

Fig. 3.10 Shape is created Courtesy-Author

Step 6. Use as many points as needed to create the shape, but avoid using more than necessary. With fewer points, it is easier to animate the shape.

Step 7. Watch the alpha matte by pressing 2 times A on keyboard. Compare it with colour composite view of created shape. You can see colour composite view by selecting the Colour Comp view on viewer panel. In colour composite view grey represent the transparent area as shown in Figure 3.11 (a) & (b).

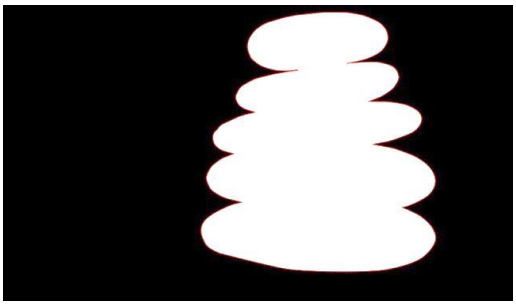


Fig. 3.11 (a) Alpha Matte of focus object

Fig. 3.11 (b) Colour Composite View

3.1.2 B-Spline

In contrast to Beziers, B-Splines don't use tangents or handles. It creates curvature automatically. The position of the points, their intensity settings as well as their proximity to each other, determine the curvature of the shape.

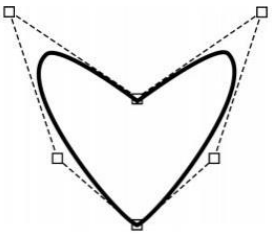
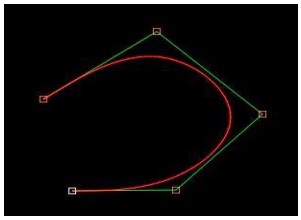
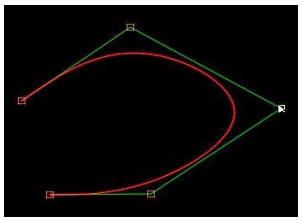
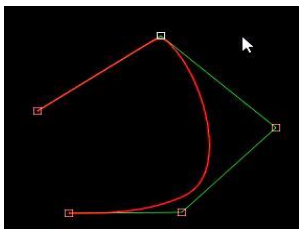
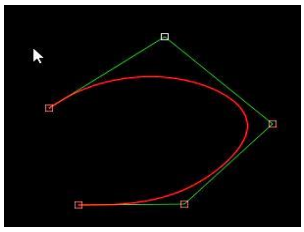


Fig. 3.12 B-Spline Courtesy-SilhouetteFX

The weight (amount of pull on a point) decides how sharp or smooth it is. SilhouetteFX© employs variable weight intensities on a point by point basis.

Table 3.2 B-Spline Curvature Control

Mouse/Key board Control	Action	Curve
Left click on screen	Create B-Spline	

Hold left key and drag the point	Move the curvature	
Alt+ drag the point to the right	Create corner point	
Alt+ drag the point to left	Create smooth point	

When right click on control point, you get these options.

1. Corner- creates corners.
2. B-Spline – smooth the curvature.
3. Centre- Create a centre according to adjacent point.

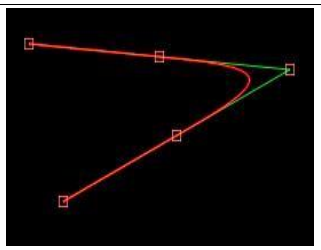


Fig. 3.13 (a) Corner

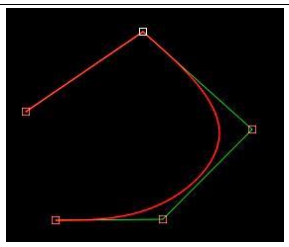


Fig. 3.13 (b) B-Spline

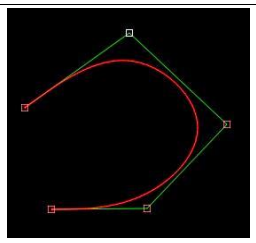


Fig. 3.13 (c) Centre

Assignment – 1

Shoot a video footage using smartphone or DSLR and create shape over the focus object using B- Spline.

3.1.3 X-Spline

X-Spline is a most popular and easily editable spline format. Its points divided in three different types: Cardinal, Corner or B-Spline as shown in Figure 3.14.

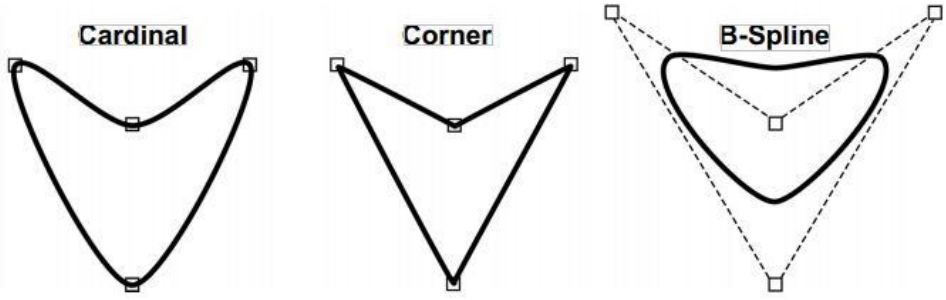
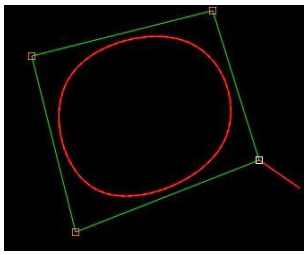
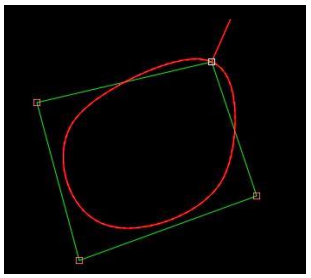
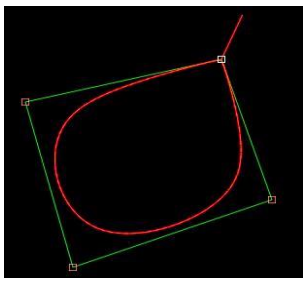
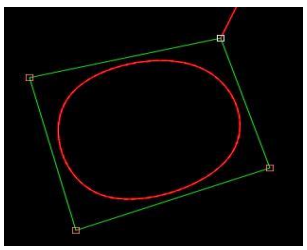


Fig. 3.14 Curvature Control Courtesy-SilhouetteFX

Table 3.3 X-Spline Curvature control

Mouse/Key board Control	Action	Curve
Left click on screen	X spline shape creates.	
Alt+ Drag the point to the left	The tension of the point goes to cardinal	
Alt+ Drag the point to toward right	The tension of the point goes to corner	
Alt+ Drag the point to extreme right	The tension of the point goes to B-spline	

You can also create corner, cardinal, B-spline and centre by right clicking on the point and selecting appropriate curve as shown in Figure 3.15.

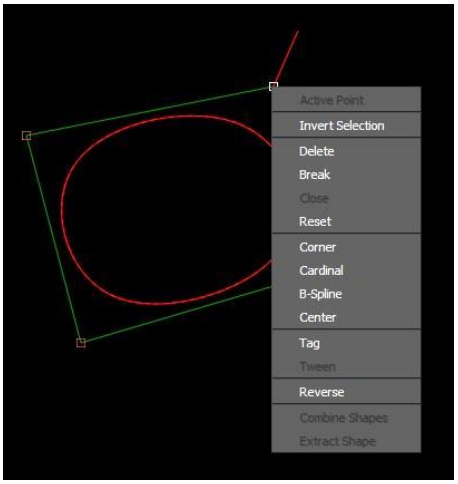


Fig. 3.15 X-spline right click option Courtesy-Author

Practical Activity 3.2 – Create a shape over the focus object using X-Spline tool.

Step 1. Select X-Spline (S) from the Toolbar. 

Step 2. Click on the screen to create a control point as shown in Figure 3.16.

Fig. 3.16 Create a control point Courtesy-Author

Step 3. Add as many points as you like as shown in Figure 3.17.

Fig. 3.17 Add multiple point to create shape Courtesy-Author

Step 4. You can adjust curve by dragging control point as shown in Figure 3.18.

Fig. 3.18 Curve adjustment using control point Courtesy-Author

Step 5. When finished adding points, click the first control point that you added to close the shape as shown in Figure 3.19.

Fig. 3.19 Shape Completed Courtesy-Author

Step 6. Use as many points as needed to create the shape, but avoid using more than necessary. It is easier to successfully animate the shape with fewer points.

Know More...

Bezier is used in inorganic shape like chair, table, lamp-post and many more.

B spline & X Spline is used in organic shape like human roto and tracking.

If over the period of time shape is changed then use X spline, B-spline.

Assignment 2

Shoot/ download a human activity video and Extract human using X-spline.

Table 3.4 Comparison between Bezier, B-Spline and X- Spline

Comparison Point	Bezier	B-Spline	X-Spline
Created by	Control point and tangent/handle	Control point	Control point
Curvature of the Shape control by	Tangents or Handles	Position of point and amount of pull on a point	Position of point and amount of pull on a point
Conversion	No	Convert in Bezier.	Convert in Bezier.
Control point Options	Linear, Corner, Cardinal, Center	Corner, B-Spline, Center	Corner, Cardinal, B-Spline, Center
Utilisation	Inorganic Shape	Organic Shape	Organic Shape

Converting B-Splines or X-Splines to Bezier Splines

You may convert your B-Splines or X-Splines to Bezier Splines at any time.

Step 1. Click on Reshape tool.

Step 2. Select a B-Spline or X-Spline shape by dragging the reshape tool as shown in Figure 3.20.

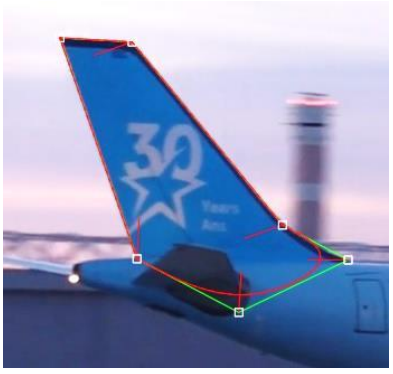


Fig. 3.20 Select the shape using Reshape tool Courtesy-Author

Step 3. Select **Actions > Edit > Convert** to Bezier as shown in Figure 3.21.

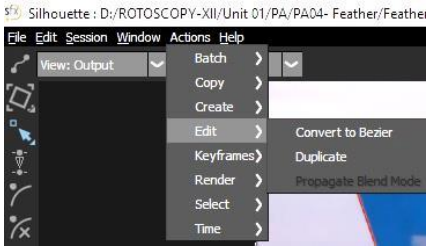


Fig. 3.21 Bezier conversion option Courtesy-Author

Step 4. Now spline has converted in to the Bezier shape as shown in Figure 3.22.

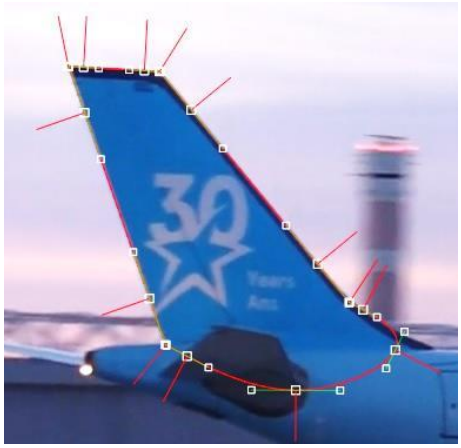


Fig. 3.22 Shape is converted to Bezier spline Courtesy-Author

Once you select Convert to Bezier, a couple of things happen. The visibility of the B-Spline or X-Spline is toggled to off. A new Bezier Spline is created and is named the same as the B-Spline or X-Spline but has an * at the end of the name as shown in Figure 3.23.

Fig. 3.23 Star mark over spline on timeline Courtesy-Author

3.1.4 Square and circle

Square and circle are included in Bezier spline. It is controlled by control point and tangent. It is useful when focus object has circular and rectangular type of shapes.

Let's create a circle on an object which has circular shapes.

Step 1. Click the centre of the roto node in trees window and select circle tool from the tool bar. Create a circle on the object as shown in Figure 3.24.

Fig. 3.24 Circle is created Courtesy-Author

Step 2. Select **Transform (T)** in toolbar and move the shape over the focus object, as shown in Figure 3.25.

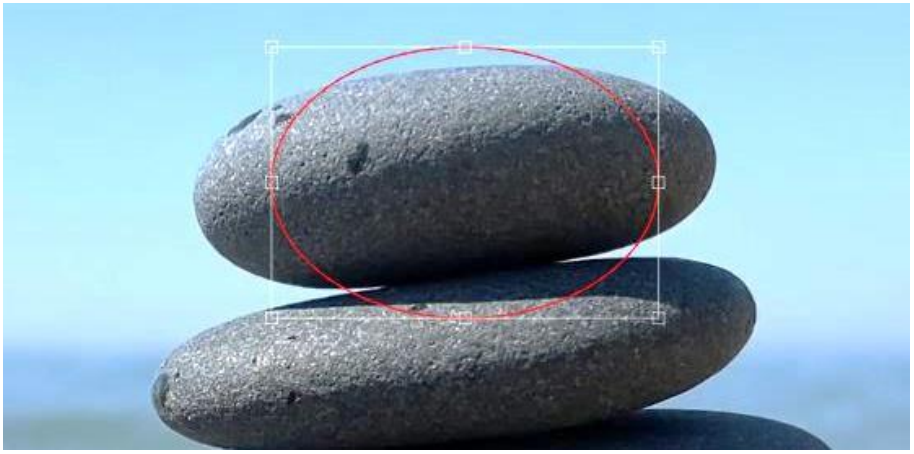


Fig. 3.25 Move the Circle Shape Courtesy-Author

Step 3. Reshape tool is used to move individual point. Select reshape tool in toolbar and adjust shape using control points and handles, as shown in Figure 3.26.

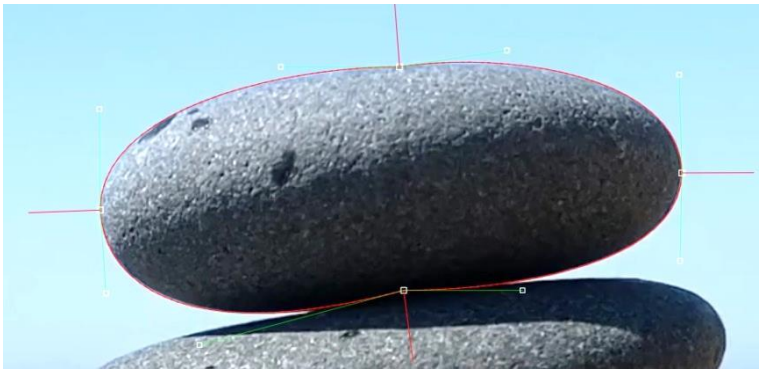


Fig. 3.26 Circle adjustment according to focus object Courtesy-Author

Step 4. If needed, add additional control point by pressing Alt key and click on the outline of the shape, as shown in Figure 3.27.

Fig. 3.27 Add additional control point Courtesy-Author

3.1.5 Open Shapes/ Open Poly

Open shapes or open poly is the kind of shapes which is open ended or not connected with their beginning and end point. Open shapes are good for rotoscoping strands of hair or thin objects. So let's create an open shape for the hair strand.

Step 1. For creating open shapes, select Bezier, B-Spline or X-Spline from the Toolbar. We will select X-Spline this time. Click on the screen to create a control point and add point over the hair strand, as shown in Figure 3.28.

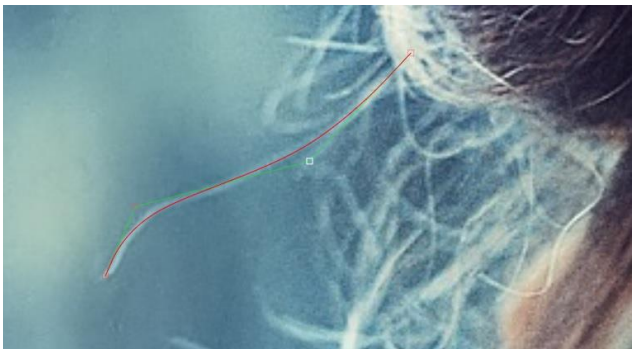


Fig. 3.28 Open Poly/Shape Courtesy-Author

Step 2. When finished adding points, select the Reshape tool. You can also press the Esc key to finish the shape.

Step 3. Select the open shape in **Object List** window, as shown in Figure 3.29.

Fig. 3.29 Select spline on object list Courtesy-Author

Step 4. To match the thickness of the hair, you should use **Stroke Width**. Select it on Object. Adjust the **Stroke Width** according to the thickness of the hair and choose a flat or round **Cap Style** as shown in Figure 3.30 (a) & (b).

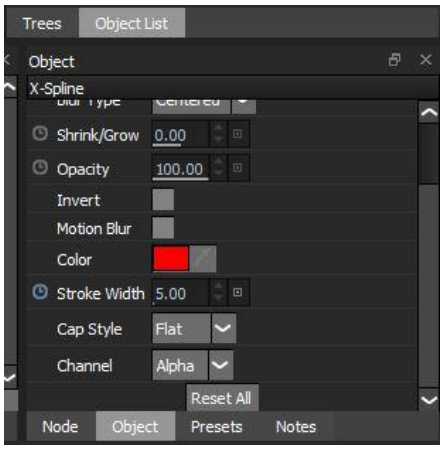


Fig. 3.30 (a) stroke width in object list Courtesy-Author

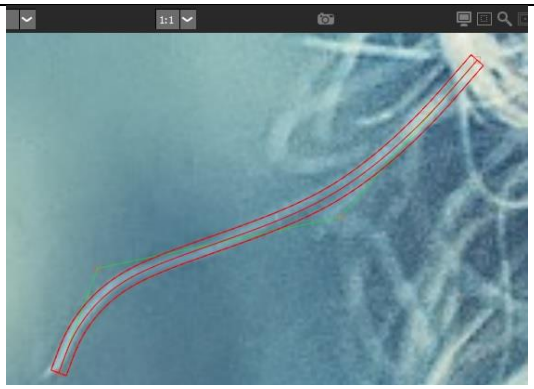


Fig. 3.30 (b) stroke width results in Viewer Courtesy-Author

Step 5. Now select Reshape tool from toolbar and click on open shape, here two controlling handle appears – Red and green. Red control the stroke width and green controls the feather as shown in Figure 3.31.

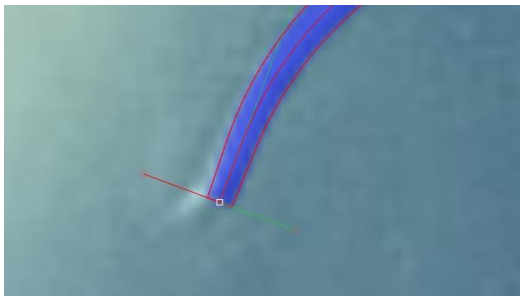


Fig. 3.31 Stroke width and feather handle Courtesy-Author

Step 6. Below you can watch alpha and colour comp view of open poly shape as shown in Figure 3.32 (a) & (b).

Fig. 3.32 (a) Alpha view of open poly

Fig. 3.32 (b) Colour Composite View

Know More...

To watch Alpha view of the shape, click 2 times A on keyboard. While Colour Comp or Colour composite view of the object can be watched by changing on view in Viewer's panel as shown in Figure 3.33

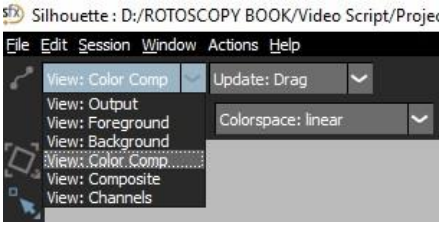


Fig. 3.33 Colour Comp View Courtesy-Author

Blend Mode

It controls how shapes are blended together. You can find blend mode in object window if shape is selected in object list window. (Figure 3.34)

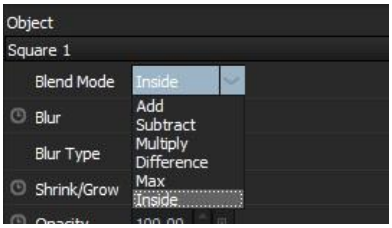


Fig. 3.34 Different Blend Mode Courtesy-Author

Blend mode is very useful while working on multiple object. Let's illustrate with Practical activity 3.2.

Practical Activity 3.2 – Demonstrate the working of Bend mode while using multiple object.

Step 1. To understand blending you need two basic shape which overlap each other. So first create two shapes into roto node using Square as shown in Figure 3.35 (a) & (b) 3.36.

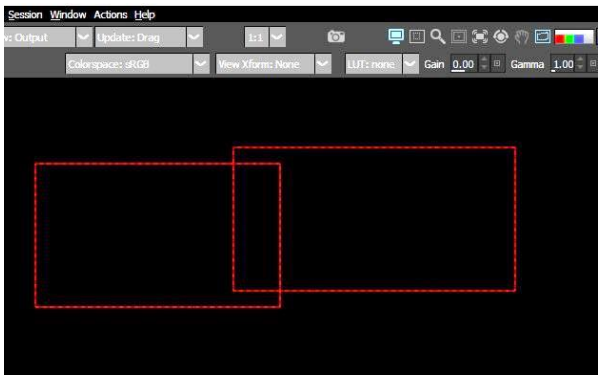


Fig. 3.35 (a) Multiple Shapes Courtesy-Author

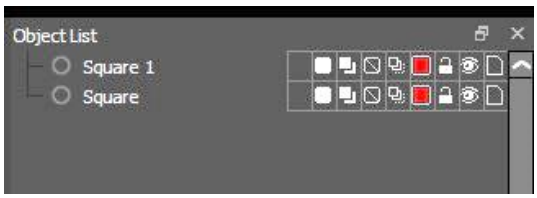


Fig. 3.36 (b) Object List Courtesy-Author

Step 2. You can watch shapes in alpha mode by clicking 'A' twice as shown in Figure 3.36.

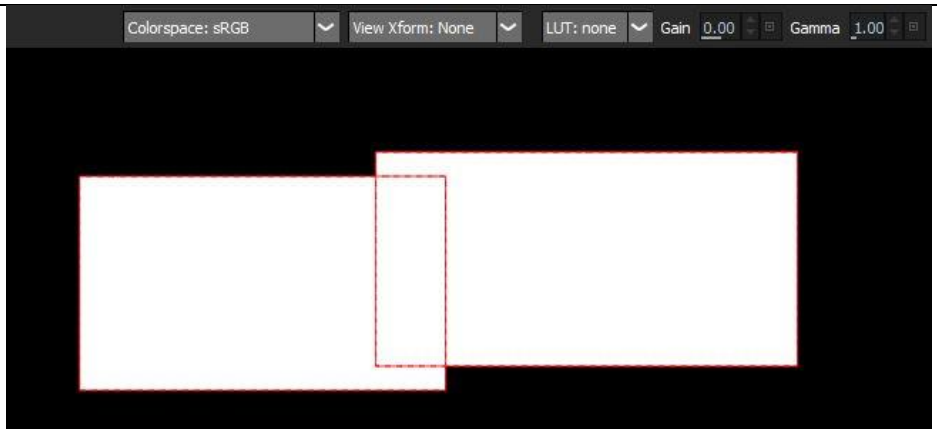


Fig. 3.36 Alpha View Courtesy-Author

Step 3. Now select the '**Square1**' shape in object list window. Its properties are showing in object window as shown in Figure 3.37 (a) & (b). Here we can change blend mode.

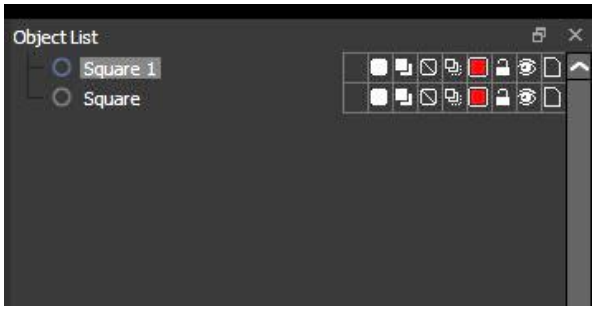


Fig. 3.37 (a) Select the shape Courtesy-Author

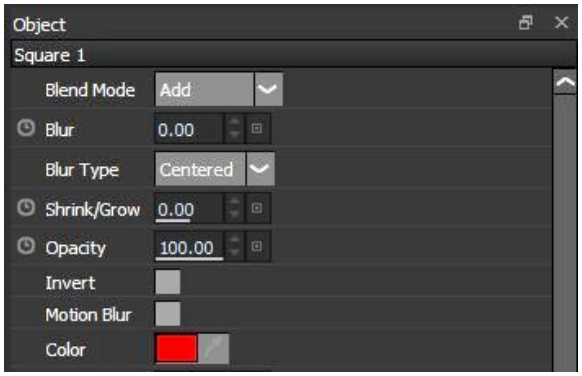


Fig. 3.37 (b) Shape properties Courtesy-Author

Step 4. Now change the blend mode and observe the changes in viewer panel as shown in Figure 3.38 (a) –(f).

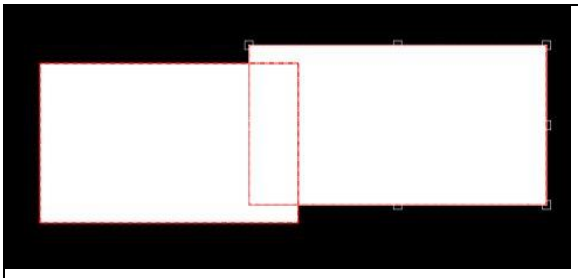


Fig. 3.38 (a) Blend Mode-Add

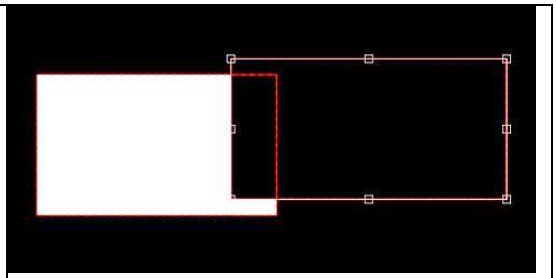


Fig. 3.38 (b) Blend Mode- Subtract

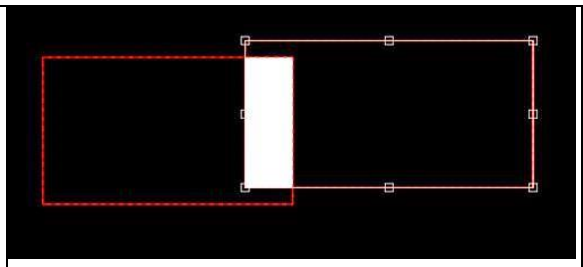


Fig. 3.38 (c) Blend Mode- Multiply

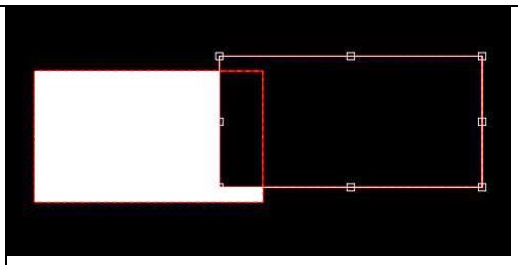


Fig. 3.38(d) Blend Mode- Difference

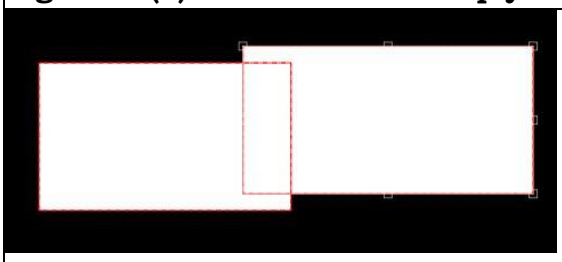


Fig. 3.38 (e) Blend Mode- Max

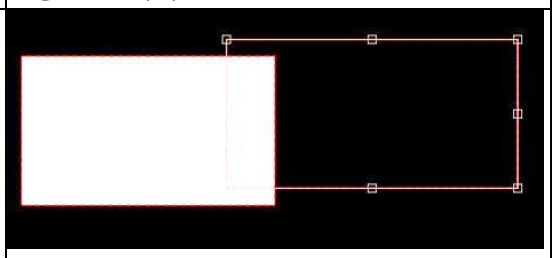


Fig. 3.38 (f) Blend Mode- Inside

Blend mode is useful if you want to subtract any area.

3.2 Reshape tool

The Reshape (R) tool modifies shapes by adjusting their control points and tangents. Once you create shape, then it can be modified with the help of reshape.

3.2.1 Adding Control Point

Step 1. Select Reshape (R)  from the Toolbar.

Step 2. Click Alt on a selected shape to add a control point as shown in Figure 3.39 (a) & (b).

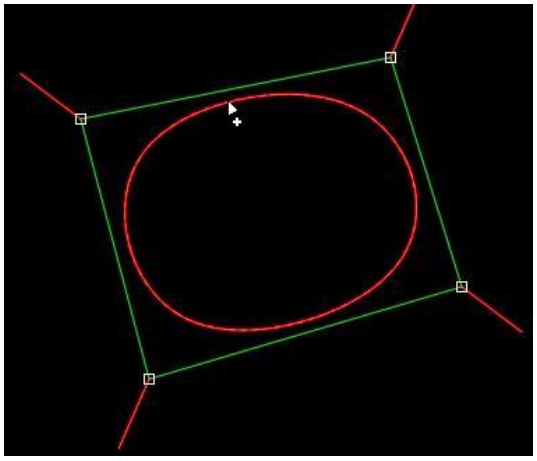


Fig. 3.39 (a) Adding reshape point

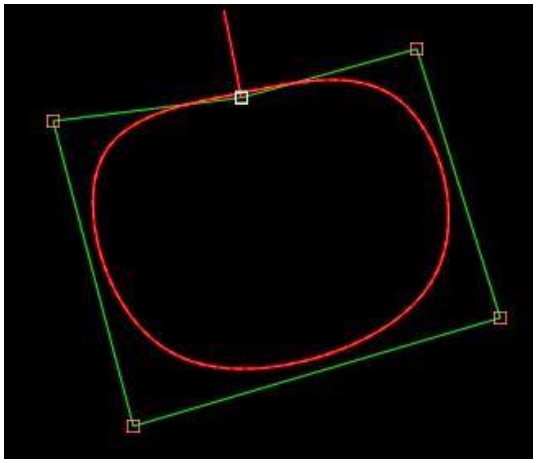


Fig. 3.39 (b) Control Point added

You can also add control point on uncompleted shape. It is very helpful when you stuck between incomplete shapes. Follow these simple steps to complete shape.

Step 1. Select reshape tool  from your toolbar.

Step 2. Click on your shape. You will see that shape points are enabled as shown in Figure 3.40.

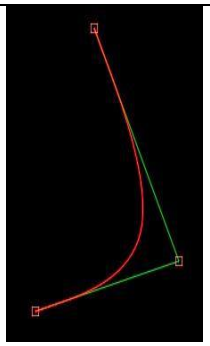


Fig. 3.40 Enable Control Point Courtesy-Author

Step 3. Now select the shape point where you want to move further and hold Alt key to create new point as shown in Figure 3.41.

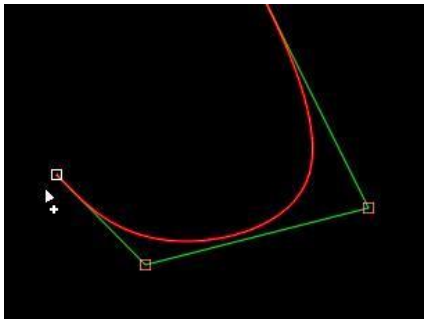


Fig. 3.41 Create New Point Courtesy-Author

Step 4. Hold alt key to complete the shape as shown in Figure 3.42.

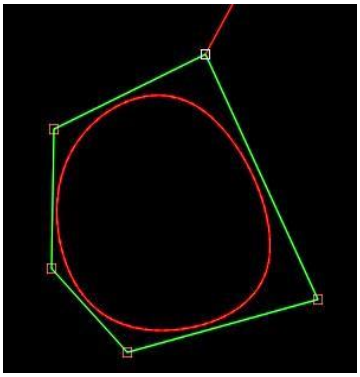


Fig. 3.42 Shape is completed Courtesy-Author

3.2.2 Deleting Control Point

Select the control point and press delete key as shown in Figure 3.43.

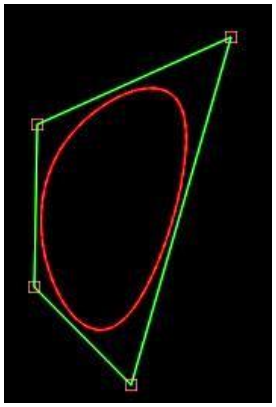


Fig. 3.43 Delete Control point Courtesy-Author

3.2.3 Moving Control Point

Select one or more control point and drag it as shown in Figure 3.44.

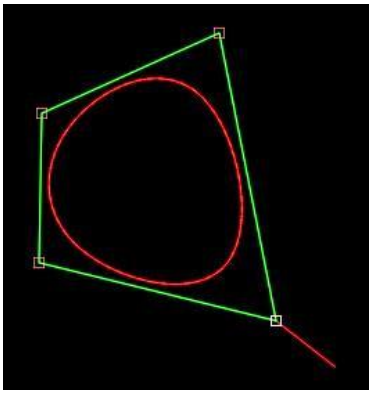


Fig. 3.44 Move Control point Courtesy-Author

3.2.4 Magnetic Reshape Tool

In magnetic Reshape tool, points near the cursor move more than the points away from curser as shown in Figure 3.45 (a) & (b).

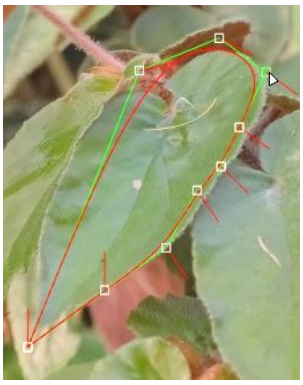


Fig. 3.45 (a) Magnetic reshape (before)

Fig. 3.45 (b) Magnetic reshape (after)

3.3 Feather

You can observe a red handle at every shape point. It is called feather handle. Shape points can be feathered to create variable edge blur as shown in Figure 3.45 (c) & (d).

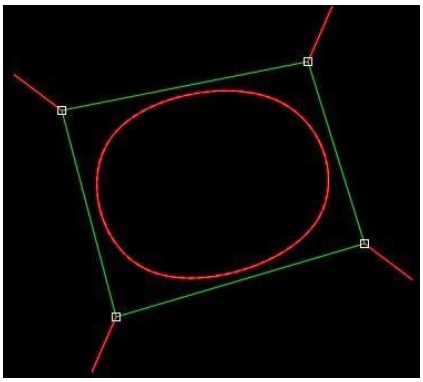


Fig. 3.45 (a) 'Feather handle' in X-Spline

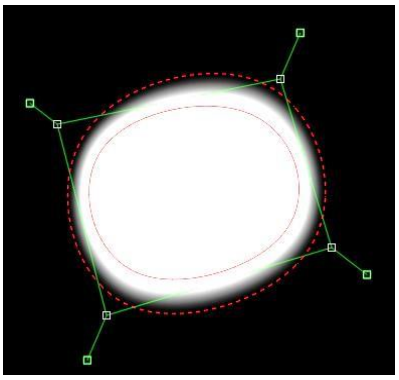


Fig.3.45 (b) Feather in alpha mode

You can apply feather in two type of shape-

a) Closed Shape
b) Open Shape

Know More...

The display of feather handle can be hidden or seen using SHIFT+F.

3.3.1 Closed Shapes-

When shape beginning point is connected with end point, then it is called Closed shape. Let's create feather in closed shape.

Step 1. Select Reshape (R) from the Toolbar.

Step 2. Select a shape point and a red, outward feather handle appears as shown in Figure 3.46.

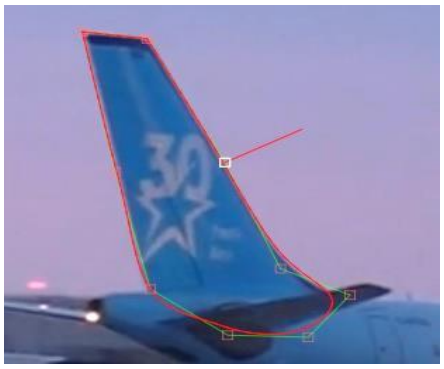


Fig. 3.46 Select Shape Point Courtesy-Author

Twice click A, to see the alpha matte as shown in Figure 3.47.

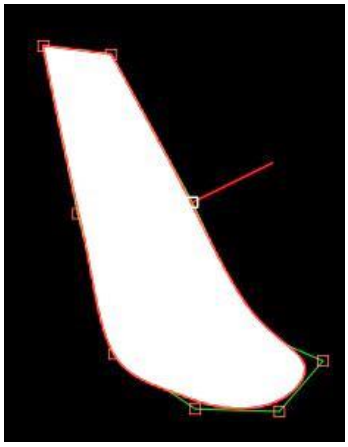


Fig. 3.47 Alpha Matte View Courtesy-Author

Step 3. Dragging this red handle outward will pull the feather out as shown in Figure 3.48.

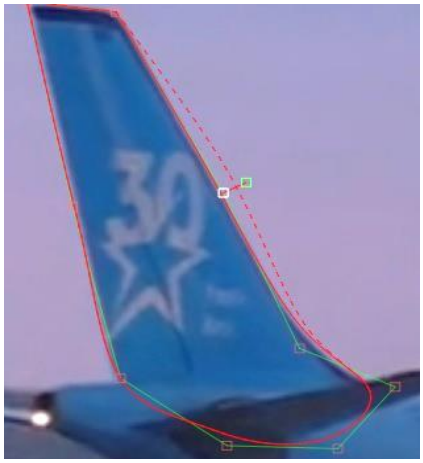


Fig. 3.48 (a) Dragging Red Handle Outward

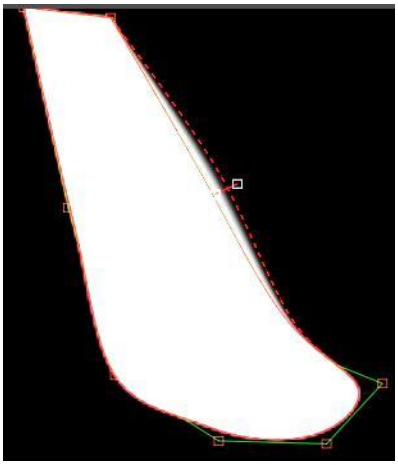


Fig. 3.48 (b) Alpha View of Feather

After the initial drag, the outer feather point can be dragged around independently.

Step 5. Multiple selected points can be dragged simultaneously by a proportionate amount as shown in Figure 3.49.

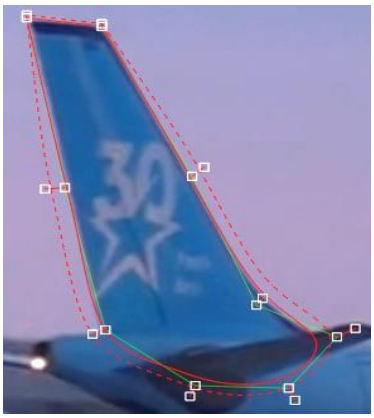


Fig. 3.49 (a) Feather on multiple point

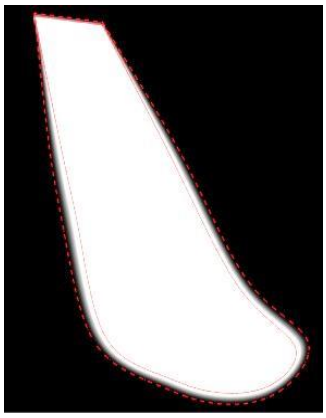


Fig. 3.49 (b) Alpha View of Feather

3.3.2 Open Shapes

Open shapes is used in hair rotoscoping.

Step 1. Make an open shape using B-spline or X-spline as shown in Figure 3.50.

Fig. 3.50 Open Shape Courtesy-Author

Step 1. Select Reshape (R)  from the Toolbar.

Step 2. Select an open shape by using Reshape tool as shown in Figure 3.51.

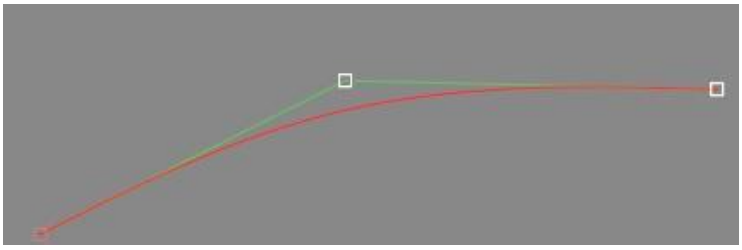


Fig. 3.51 Select control point using reshape tool Courtesy-Author

Step 3. Adjust the Stroke Width to set its thickness and choose either a flat or round Cap Style in the Object window as shown in Figure 3.52.

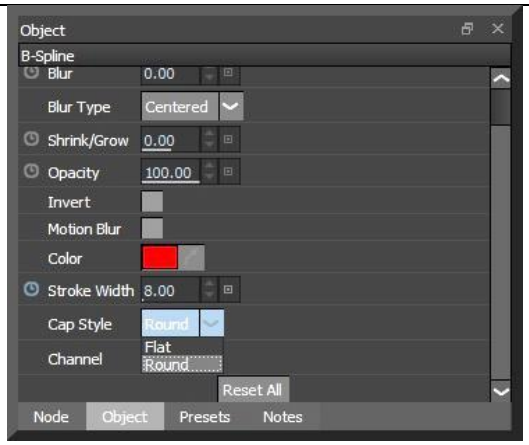


Fig. 3.52 Increase Stroke Width on object window Courtesy-Author

Step 4. Once you've done this, additional per-point feather handles appear in red colour as shown in Figure 3.53 for the Stroke Width and a green one for the Feather.

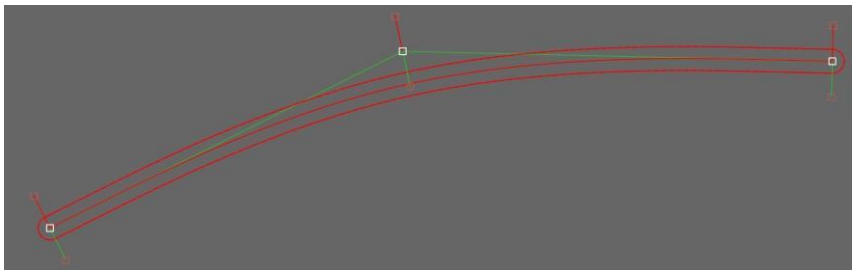


Fig. 3.53 Feather Handle Courtesy-Author

Step 5. Just drag on the handles to make adjustments as shown in Figure 3.54.

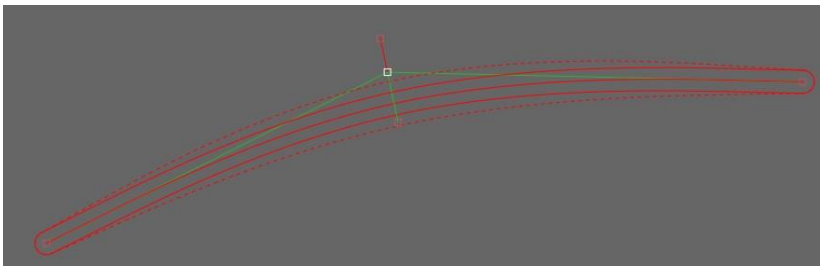


Fig. 3.54 Adjust the feather using feather handle Courtesy-Author

Click 2 times A (AA) to see the shape matte as shown in Figure 3.55.

Fig. 3.55 Alpha View of Feather Courtesy-Author

Step 6. Multiple selected points can be dragged simultaneously by a proportionate amount as shown in Figure 3.56.

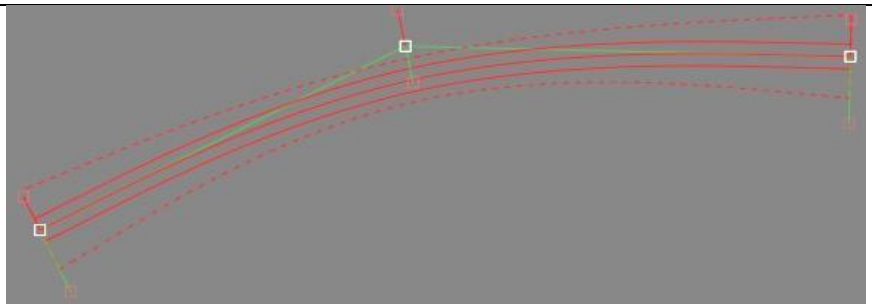


Fig. 3.56 Feather on Multiple Selected points Courtesy-Author

Fig. 3.57 Alpha View Courtesy-Author

3.4 Navigating the viewer with tools:

In SilhouetteFX© software, navigation in viewer is essential for rotoscoping. Most of the time, you need to enlarge the frame for see the detail of the focus object.

Action	**Shortcut keys**
Maximize Viewer	F3
Zoom in	+ or move mouse wheel forward
Zoom out	- or move mouse wheel backward
Navigate the object or panning	SPACE + hold the left mouse button
Go to the Next frame	X
Go to the previous frame	Z

3.5 Breakdown subject in to Shapes for rotoscoping

As discussed in Chapter 1, you need to breakdown object in different shapes to perform roto work easily. Now you have the knowledge of different shape likes Bezier, B-Spline and X-Spline. Some important steps are mentioned here which will help you to convert subject in to shapes for rotoscoping.

Analyze the Clip – Playback the video-clip and determine the frame that have complete shape of focus object with sharp detail. This frame requires maximum number of points to create shape which can be reduced, if not required further.

Select a Spline Type – After selecting frame for rotoscoping, you need to determine spline type. In SilhouetteFX©, you can create shapes by using B-Splines, X-Splines, Bezier splines, Circles and Squares.

Create Shapes with Less Points – Use as many points as needed to create the shape, but avoid using more than is necessary. The fewer the points, the easier it is to successfully animate the shape. Unnecessary shape complexity inevitably leads to inconsistency when editing points.

Create Multiple Shapes – Never try to roto the object by using single shape. Always create multiple shapes to Roto complex object. Drawing separate shapes for the major parts of an object give you finer control over motion.

Now using these tips, lets create shapes for given object.

Practical Activity 3.3 – Breakdown the given boat in to multiple shapes.

Step 1. Analyze video footage before breakdown the object. Playback it many times and find out the frame which has complete shape and detail (Figure 3.57).

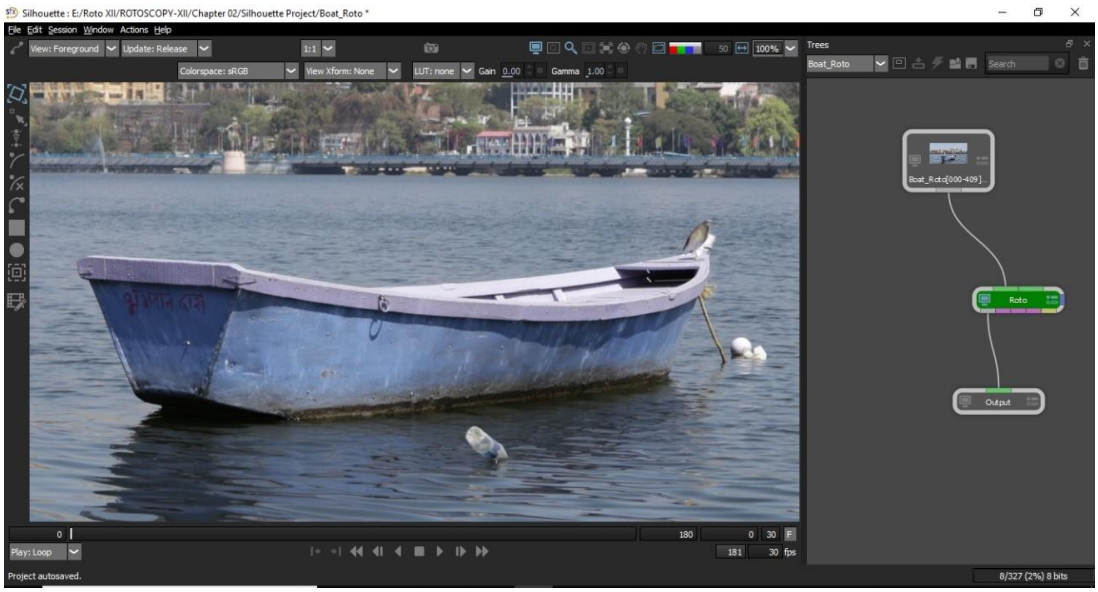


Fig. 3.57 Playback the footage multiple times Courtesy-Author

Step 2. Observe that first frame has complete shape and detail. So start roto from this frame but it is better to find frame with maximum detail and shape, whether it is 1st, 25th or even last frame. Now see the last frame of the footage and compare it with first frame. It helps you to decide in shape breakdown (Figure 3.58).

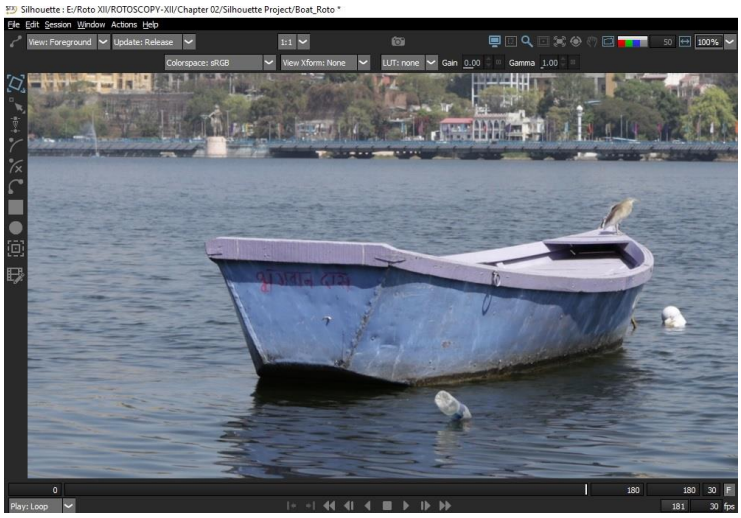


Fig. 3.58 Last Frame Courtesy-Author

Step 3. After analyzing these two frames, breakdown the boat in following shapes so that they can easily animate (Figure 3.59).

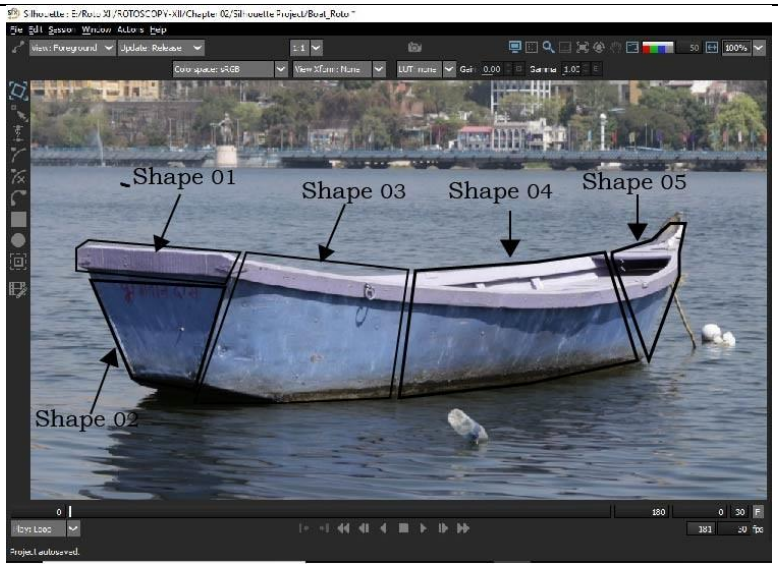


Fig. 3.59 Shape Breakdown Visualisation Courtesy-Author

Step 4. Select Bezier tool from tool panel and start tracing first shape (Figure 3.60).

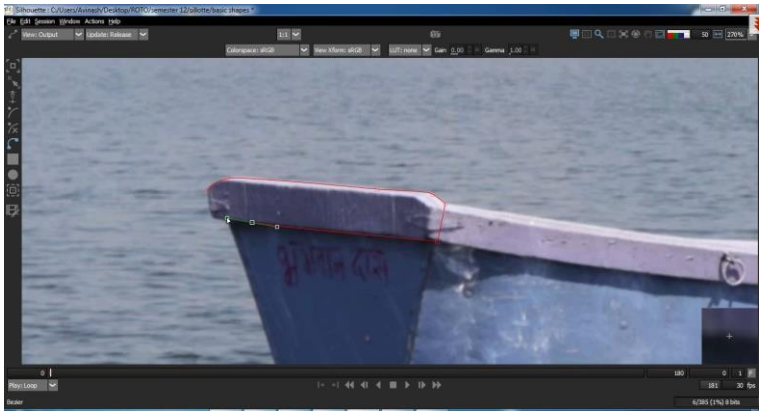


Fig. 3.60 Tracing the frame through Bezier spline Courtesy-Author

Step 5. In the completion of the shape, click on the first point (Figure 3.61).

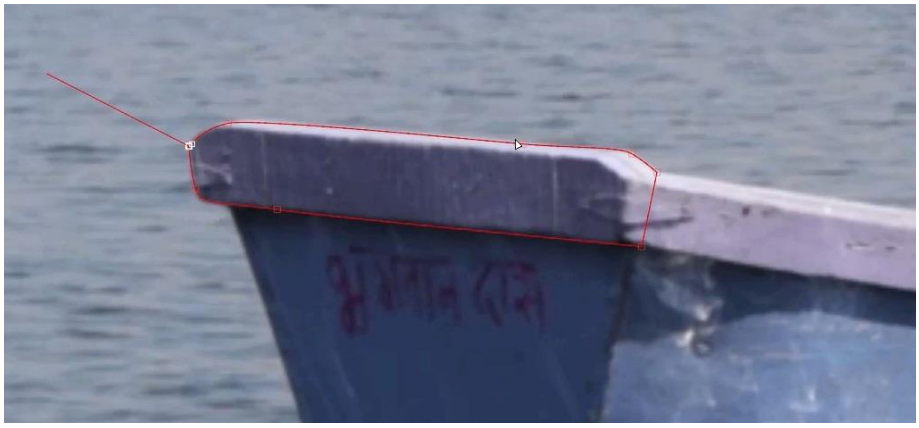


Fig. 3.61 First Shape is completed Courtesy-Author

Step 6. Once again check the **Shape 1** and delete unnecessary points (Figure 3.62).

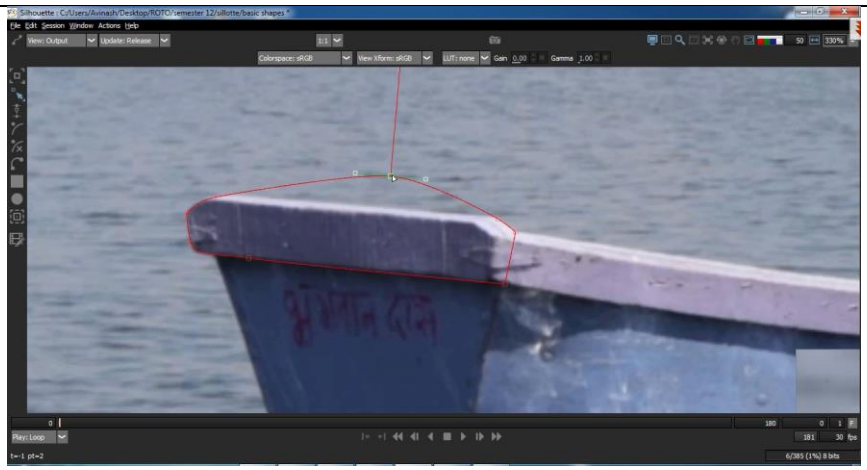


Fig. 3.62 Delete unnecessary points Courtesy-Author

Step 7. Now make second shape for this, once again select Bezier tool and make first point (Figure 3.63).

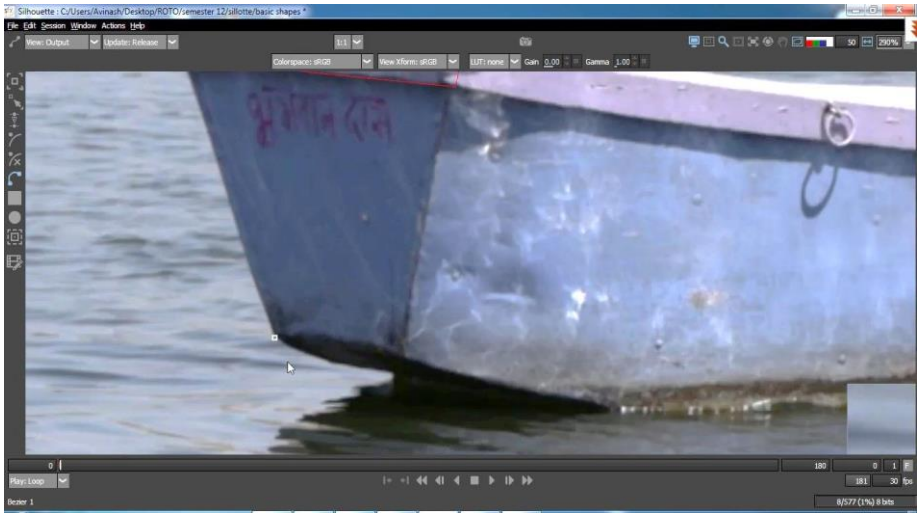


Fig. 3.63 Create point for Second shape Courtesy-Author

Step 8. By joining beginning and end point, shape will be completed (Figure 3.64).

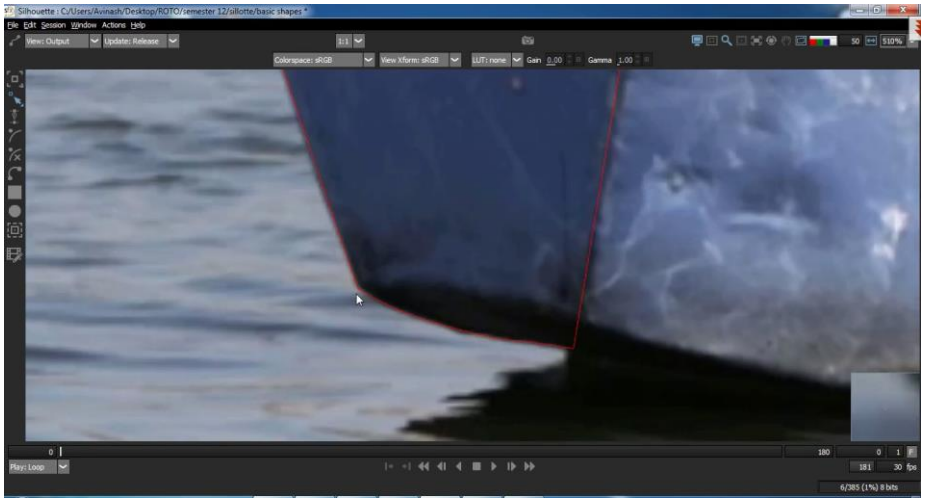


Fig. 3.64 Join beginning and end point Courtesy-Author

Step 9. In this way, you can breakdown the subject in to different shape (Figure 3.65).

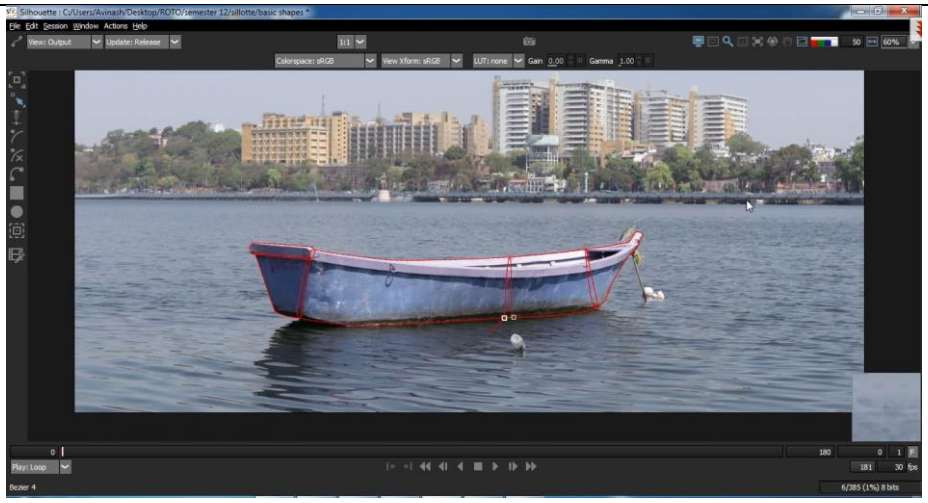


Fig. 3.65 Object breakdown in multiple shapes Courtesy-Author

Step 10. Press twice the key with letter **A** on keyboard and watch the final object in alpha channel (Figure 3.66).

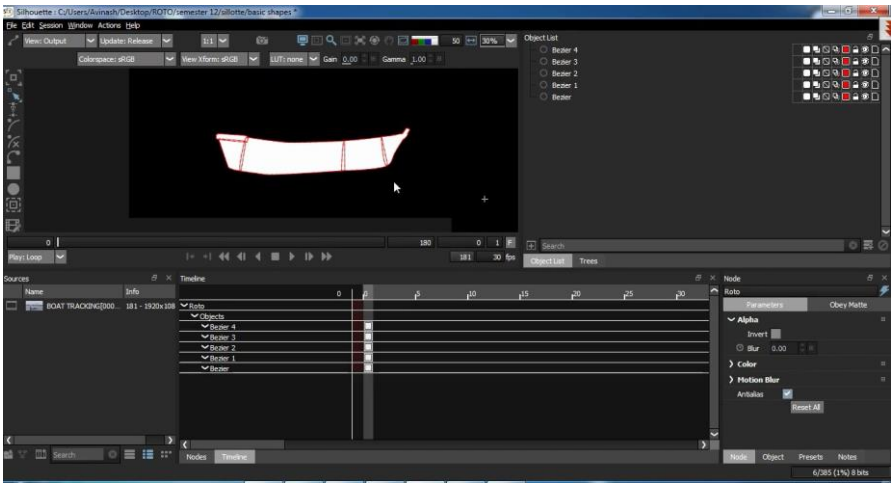


Fig. 3.66 Output Alpha view Courtesy-Author

Step 11. This is color composite output of the subject (Figure 3.67).

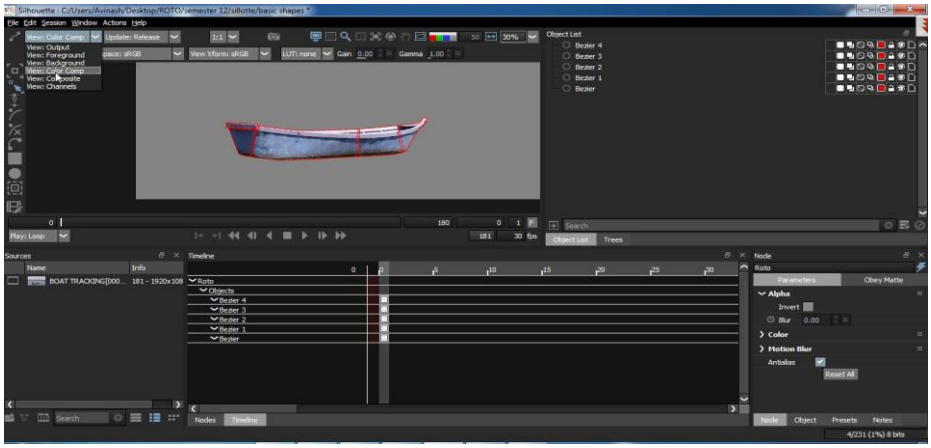


Fig. 3.67 color composite output Courtesy-Author

So, with the help of different splines you can breakdown your object in different shape, which helps you on rotoscoping. In the next chapter, we will learn to animate the shapes.

Summary

Bezier is a same tool you used as the Photoshop or after effects pen tool.

X-spline and B-spline is used for rotoscoping organic shapes like humans or animals.

B-spline and X-spline don't use handles to control the shape; instead they create the curvature automatically.

B-Spline and X-spline can be converted to Bezier but Bezier cannot be converted to any other shape.

Square and Circle shape belong to Bezier shape.

In any shapes, reshape tool is used to adjust individual points.

Open shape or open poly is used to roto thin object such as hair strands.

Blend mode can add, subtract, multiply and differentiate between two shapes.

Never create single shape for whole object, break it into the multiple shapes for hassle free rotoscoping.

Check Your Progress

A. Multiple Choice Questions

1. B Spline, X Spline and Beziers are_____(a) Animating Tools (b) Drawing Tools (c) Tracker (d) Paint tool
2. Bezier splines are defined by (a) Control points (b) Tangents (c) Control points and tangents (d) Feather handle
3. In Bezier spline, curvature appears by (a) Left click on screen (b) Hold down left click (c) Click and drag tangent handle (d) CTRL+drag tangent handle
4. Short-key for bezier spline is (a) B (b) S (c) Shift+B (d) Shift+S
5. B-Spline doesn't use (a) Curvature (b) tangents or handles (c) Depth (d) Cardinal
6. Create corner point in B Spline by (a) Hold left key and drag the point (b) Alt+Drag the point (c) Left click on screen (d) Alt+drag the point to left
7. X-Spline points does not have (a) Cardinal (b) Corner (c) B-Spline (d) Tracker
8. In which shape, B spline and X Spline is not used (a) Inorganic shape (b) Organic shape (c) Complex Shape (d) Simple shape
9. Open Shape is useful for (a) Face Roto (b) Hand Roto (c) Hair Roto (d) Cloth Roto
10. Reshape tool modifies shapes by (a) adjusting control point (b) tangents (c) Control point and tangents (d) None of the above

B. Fill in the blanks

1. In Bezier tool tangent or handle controls_____.
2. In Bezier tool, right clicking on any control point, cardinal appears which create_____.
3. B-Spline creates _____ automatically.
4. Shape can be adjusted by _____ tool.
5. In magnetic Reshape tool, points near the cursor____ than the points away from curser.
6. Red handle in every shape point is called_____.
7. Dragging red handle_____ will pull the feather out.
8. Short-key for go to the next frame is_____.
9. Create_____ shapes to Roto complex objects.
10. Press _____on keyboard, to watch the final object in alpha channel.

C. True or False

1. Square and circle are animating tools.
2. Bezier tool is as similar as Pen tool in Photoshop.
3. In Bezier, selecting corner by right clicking collapses both tangent point.
4. You can create B-spline by right click on viewer.
5. In X spline, you can create cardinal, corner and B-spline by right click on the point.
6. Bezier can be used in organic shape.
7. Once you select Convert to Bezier, the visibility of the B-Spline or X-Spline is toggled to off.
8. To create a perfect square, hold down the CTRL key while clicking and dragging in the shape of a square.
9. In open poly, you need to connect first point with end point.
10. You need to adjust the stroke width to set the thickness of open shape.

D. Short answer questions

1. Write the use of different drawing tools used in rotoscoping.
2. What is Bezier? When it is used.
3. How to adjust Bezier curve?
4. What is B-spline and X-spline?
5. Write the Comparison between Bezier, B-spline and X-Spline.
6. How can you control X-Spline Curvature?
7. What is Reshape tool? Write its use on drawing shapes.
8. How to add control point on uncompleted shape?
9. What is Edge Feather?
10. Write the use of Edge Feather in roto shape.
11. Write the steps to break an object in multiple shapes.

Session 4. Roto Artist – Roles and Responsibility

In the last chapter, you have learned the object breakdown technique using splines and breakdown the boat in the multiple shapes. Now you need to animate shapes according to the subject movement. If you compare first frame of your subject with the last frame as shown in Figure 4.1 & Figure 4.2, then you can find that your boat is moving, although shape is still there. So here you need to animate the shapes over the object.

Fig. 4.1 First frame of the boat with spline Courtesy-Author

Fig. 4.2 Last frame of the boat with spline Courtesy-Author

Let us learn the two important tools that are required to animate the boat shape.

1. Transform tool – to move the shape.
2. Reshape tool – to adjust the shape according to focus object.

4.1 Transform tool

Transform tool is used to animate the shape. The boat which is breakdown into multiple shapes needs to change over time according to the object movement. For this you have to adjust the shape so that it exactly matches the focus object. The Transform tool affects an entire shape or a group of shapes.

Enable the tool panel to locate the transform tool of roto node. Transform tool is divided in two modes as shown in Table 4.1.

Table 4.1 Transform Mode

Transform Mode	Icon	Shortcut Key
Shape (Object) Mode		T
Point (Sub-object) Mode		TT

4.1.1 Shape (Object) Mode

Shape mode deals with the shape as a whole, without changing the point individually. When you are working in a shape mode, a bounding box appears around the shape as shown in Figure 4.3. With this bounding box, a shape can be positioned, moved, scale, rotated, sheared or corner-pinned.

It is preferable to manipulate the spline in Shape mode because it keeps the shape constant for the life of that shape and minimizes jitter.

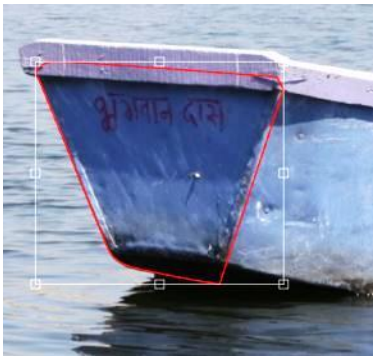


Fig. 4.3 Shape Mode Courtesy-Author

4.1.2 Point/ Sub-object Mode

To manipulate small portion of the shape, you need to deal with point mode. Point Mode allows to position, move, scale, rotate and corner pin a selection of point in shapes using on screen controls. In Point mode you need to select control point by using reshape tool as shown in Figure 4.4 (a) then you can transform these point as shown in Figure 4.4 (b).

Fig. 4.4 (a) Select control Point

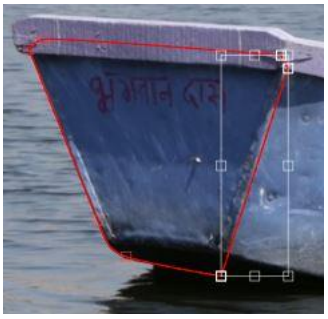


Fig. 4.4 (b) Enable Point Mode

Once you select the shape, you can modify it in both Shape and Point mode.

Moving shape

It is required to move shapes according to object rather than just moving it horizontally and vertically. Follow the following steps to moving the shape.

Step 1. Make sure that Transform (T)  Shape Mode is enabled.

Step 2. Select a shape or series of shapes as shown in Figure 4.5.

Fig. 4.5 Select a Shape Courtesy-Author

Step 3. Drag on the outline of one of the shapes, as shown in Figure 4.6.

Fig. 4.6 Drag the outline of the shape Courtesy-Author

Hold the shift key during the movement of the shape. It will constrain the movement by the first direction that you drag in.

Nudging Shapes

Sometimes it is required to do the little movement of the shape. It is performed by Nudging Shapes. Shapes can be nudged horizontally or vertically using the arrow keys. Pressing the arrow key single time moves the shapes 1 pixel. Using the Shift key in conjunction with arrow keys moves the shapes by 10 pixels.

Scaling Shapes

Scaling changes the size of the shapes. Figure 4.7 (a) & (b) shows the shape before scaling and after scaling. To enable scaling tool, go to the bounding box corner. In scaling, hold down the shift key for proportion.

Fig. 4.7 (a) Scaling shapes (before)

Fig. 4.7 (b) Scaling shapes (after)

Rotating

It changes the angle of shape. It is very helpful in human rotoscoping because there you need to rotate the shapes according to object movement.

To enable rotating hold down the **Ctrl key** on bounding box corner and drag the mouse to rotate the shape, as shown in Figure 4.8 (a) & (b).

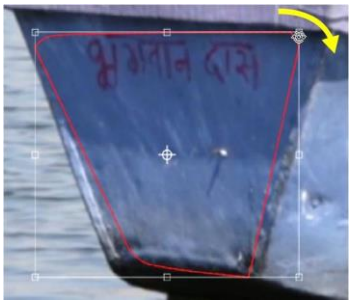


Fig. 4.8 (a) Rotating tools enable

Fig. 4.8 (b) Rotating the shape

Corner-Pinning Shapes

The corner points of a shape's bounding box can be corner-pinned. For instance, you can easily fit the shape into the corners of a boat, as shown in Fig. 4.9 (a) & (b). For Corner Pinning select the shape, hold Alt Key and drag the corner of the shape.

Fig. 4.9 (a) Hold Alt key and select the corner

Fig.4.9 (b) Corner Pinning on the right top corner

Shearing Shapes

It is a technique of transformation, which changes the shape of an object along X and Y axis. In shearing, shape being skewed horizontally or vertically. To perform shearing, hold the Ctrl key and drag on the midpoint of the shape bounding box either in vertical or horizontal axis, as shown in Fig. 4.10 (a) & (b).

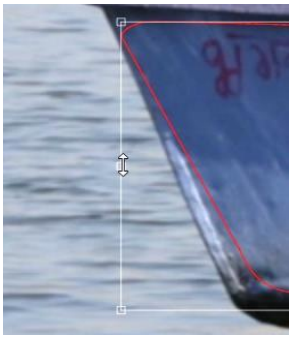


Fig. 4.10 (a) Shearing (before)

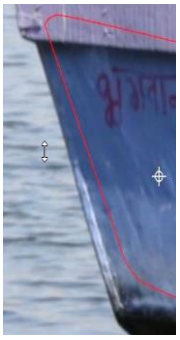


Fig. 4.10 (b) Shearing (after)

Anchor Point – A shape rotates around its anchor point, but scales from the opposite handle. Moving the anchor point changes the centre of rotation and scaling when using the on-screen controls. You can activate and deactivate anchor point by pressing **(.)** period key. You can also shift anchor point by holding down left mouse key and drag. As shown in Figure 4.11 (a) – (c).

Fig. 4.11 (a) Anchor Point

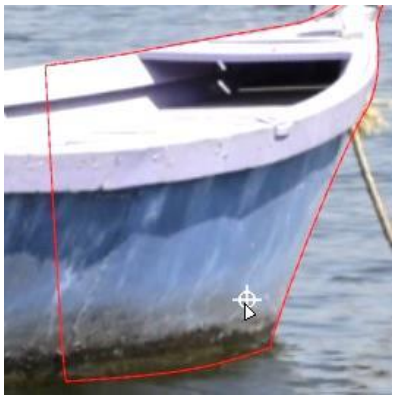


Fig. 4.11 (b) Shifting Anchor Point

Fig. 4.11 (c) Scales from opposite handle from anchor point

Assignment 1

Practice following tools to animate shape according to focus object.

1. Moving 2. Shearing 3. Scaling4. Corner Pinning 5. Anchor Point

4.2 Setting the Anchor Point and using special transformation tool

Whenever you animate shapes, initially you need these three tools- move, rotate and scale. These are the short keys of these tools, as shown in Table 4.2

Table 4.2 most widely used Transform tool

Q	Activate and Deactivate Moving tool
W	Activate and Deactivate rotation with anchor point
E	Activate and Deactivate Scale with anchor point

Assignment 2

Animate any breakdown shape of object by using Q (moving), W (rotation) and E (scale). Only use these short keys to modify the shapes.

4.3 Using Reshape tool in transformation

Reshape tool is used in drawing shape. But once you start moving shapes according to subject, you need to reshape it to cover the focus object as shown in Figure 4.12.

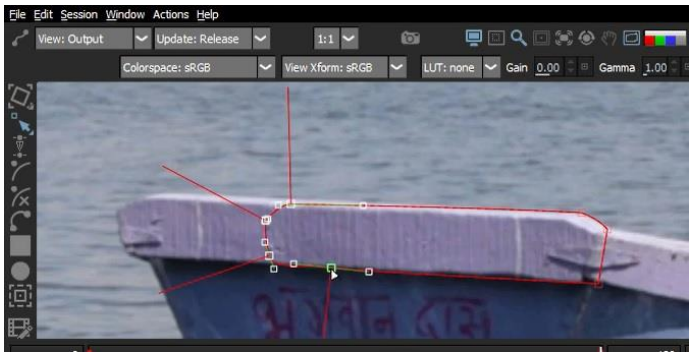


Fig. 4.12 Reshape the group of key frames Courtesy-Author

Know More...

Never move an individual control point. Because it can create jittery movement. Always move group of point while using reshape tool.

4.4 Key frame Techniques

There are essentially two ways to animating shapes for rotoscoping-

1. Timeline key framing
2. Motion-based key framing

Timeline key framing – It involves placing key frames at set intervals within the timeline, without taking into account the motion of the focus object.

Motion-based key framing – In this technique, key frames are created on the basis of movement and direction of the focus object.

4.4.1 Timeline Key framing – In this technique roto-artist establishes key frame on the timeline. It is useful when your focus object does not have definite movement but has similar shapes for long duration and even till disappearing from frame. It can be divided in two techniques.

Bifurcation – It means division of something in to two branches or parts. In this technique the total number of frames is divided in two parts and then modifies it. To understand it,

Suppose Total frames = 180

So you need to modify shapes 1st and 180th frame.

Then find middle frame, which is 90th frame, you need to modify it first. In this way, you can modify 45th, 23th and others middle frame till then, you get perfect movement of the shapes according to object.

Practical Activity 4.1 – Animate the boat by using Bifurcation technique.

We have already seen to breakdown the shape of the boat in Chapter 3. Now we will animate the shapes over the focus object (boat).

Step 1. Observe the shape breakdown in Figure 4.13 and decide which shape you want to animate first. Here you can see the object list and timeline. In object list you have all the shape and in timeline, key frame will be inserted.

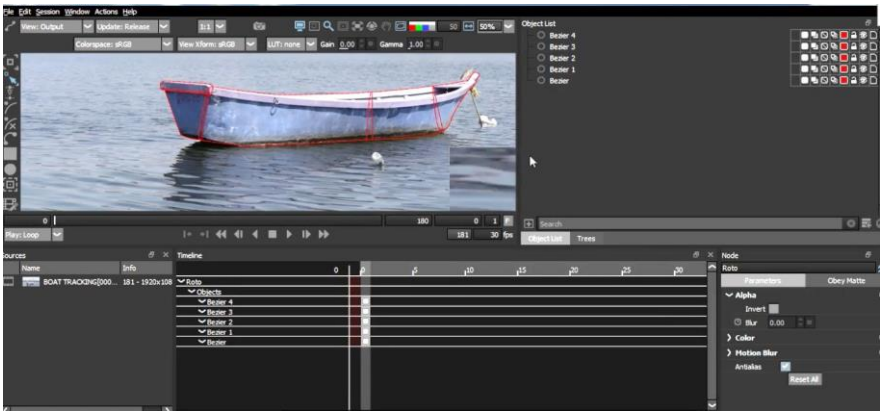


Fig. 4.13 Shape Breakdown Courtesy-Author

Step 2. In Object list, disable all shape except Bezier. Now you can observe in Figure 4.14, single shape is enabled on screen.

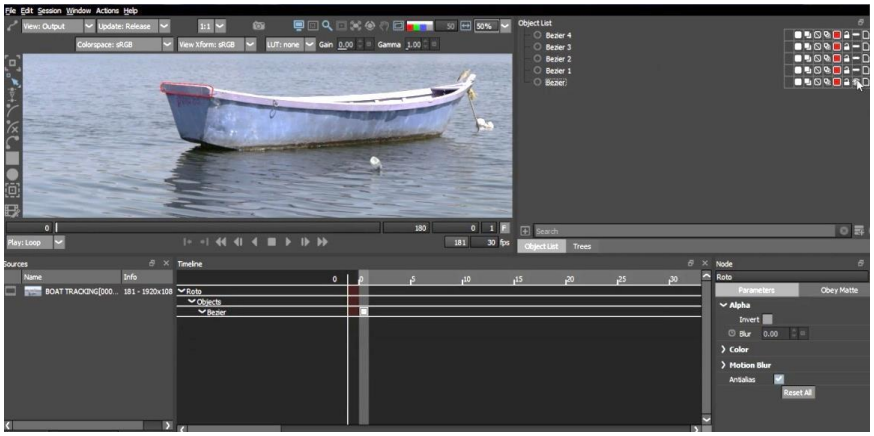


Fig. 4.14 Disable all shapes except Bezier Courtesy-Author

Step 3. To animate the shape according to focus object, select transform tool as shown in Figure 4.15 from tool panel. Click on transform tool, shape transform enables in viewer panel.

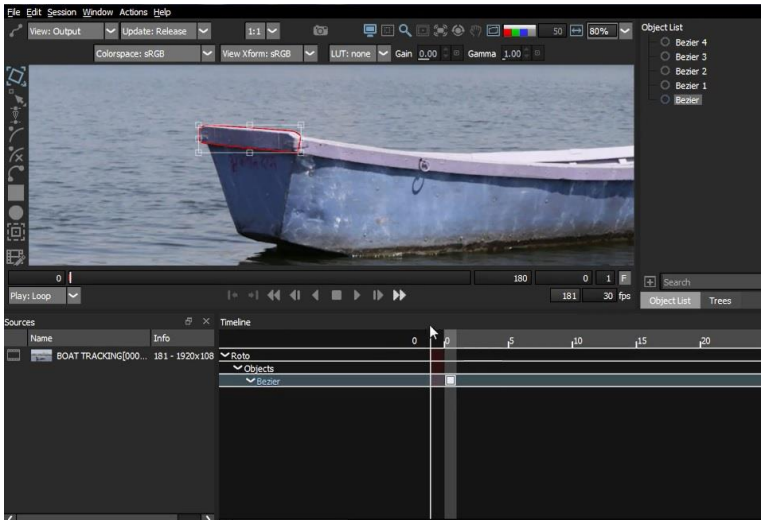


Fig. 4.15 Select Transform tool Courtesy-Author

Step 4. Move to last frame, by pressing End key on keyboard. You can observe in Figure 4.16, boat has changed place while shape is still. You need to move the shape by using Shape transform tool.

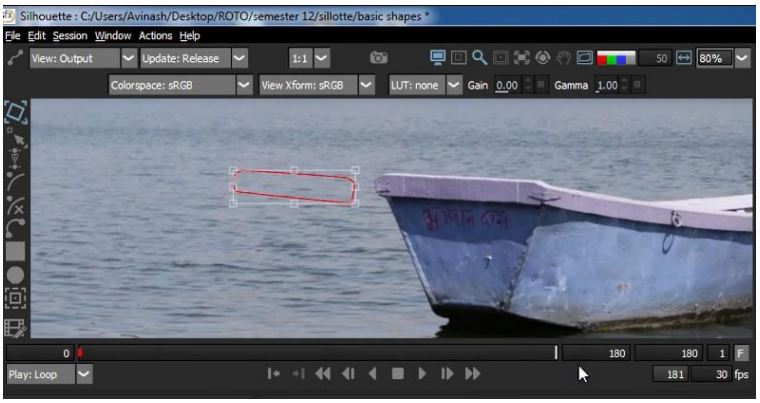


Fig. 4.16 Move to last Frame Courtesy-Author

Step 5. For moving the shape over object, place the cursor on the outline of the shape. The **move tool** will now be displayed as shown in Figure 4.17. Hold the left key and move the shape over the boat.

Fig. 4.17 Drag the shape using Move tool Courtesy-Author

Step 6. Observe that shape is not perfectly matching with object. So, you need to adjust its angle by pressing W key on keyboard which enables rotate tool as shown in Figure 4.18.

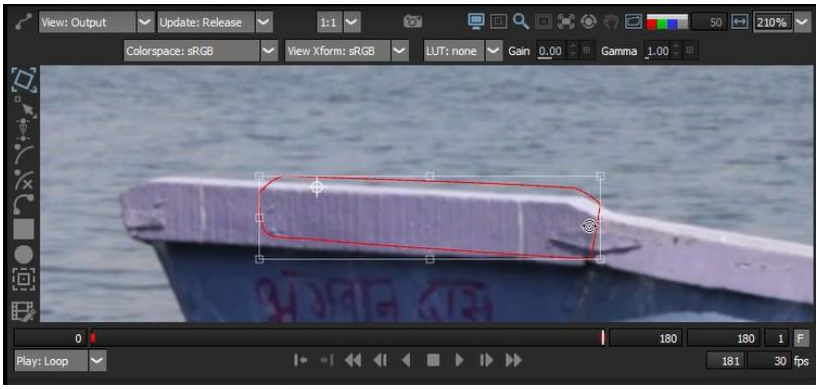


Fig. 4.18 Select Rotate tool Courtesy-Author

Step 7. Once you adjust the angle, you need to adjust group of points. For this, select the Reshape Tool from tool bar and select group of point as shown in Figure 4.19

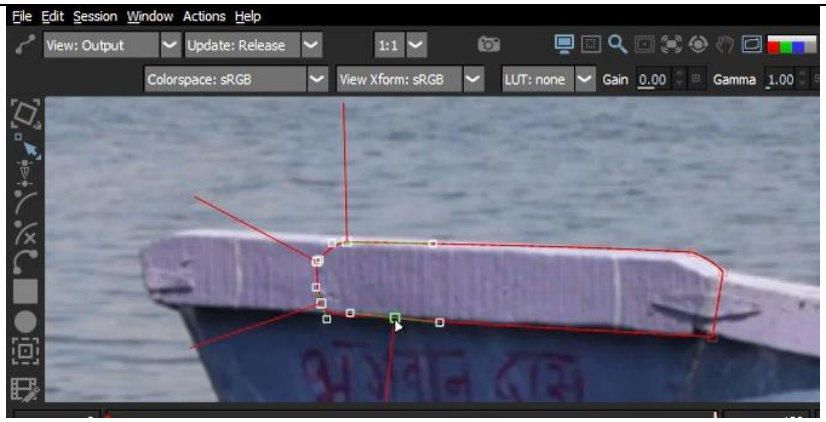


Fig. 4.19 Select Reshape tool Courtesy-Author

Step 8. Drag the group of points with mouse and place it according to the boat as shown in Figure 4.20.

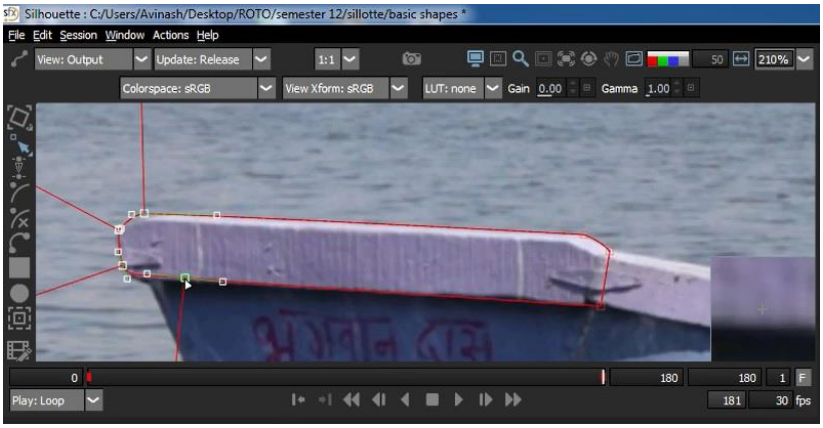


Fig. 4.20 Drag group of points Courtesy-Author

Step 9. In Figure 4.21, observe that key-frame is automatically placed in the last frame. It means as you animate the shapes, key-frame is inserted in timeline.

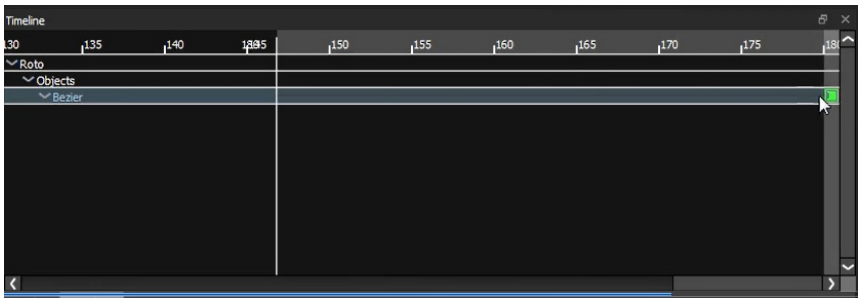


Fig. 4.21 Key frame inserted in last frame Courtesy-Author

Step 10. In bifurcation method, bifurcate the frame and modify the middle one. So, you need to modify 90th frame (Figure 4.22).

Fig. 4.22 Navigate the cursor in Middle Frame Courtesy-Author

Step 11. Modify it with reshape tool as shown in Figure 4.23.

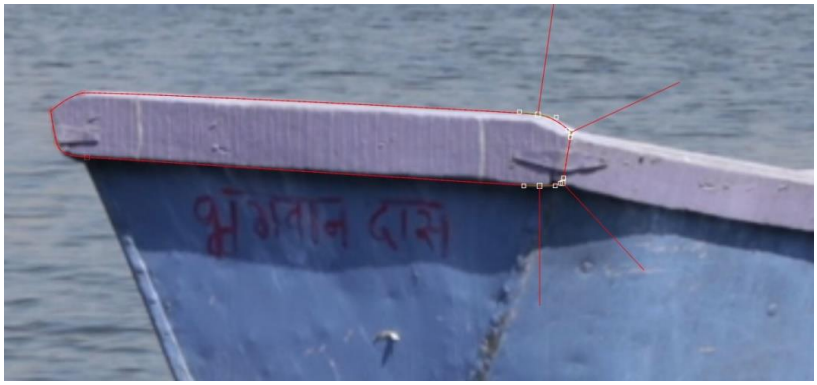


Fig. 4.23 Modify the Shape Courtesy-Author

Step 12. In this method, each time you need to modify the bifurcated frame as shown in Figure 4.24, until the correct movement of shape according to focus object is achieved.

Fig. 4.24 Modify the Shape using Bifurcation Method Courtesy-Author

4.5.2 Incremental Key Frames

If the focus object to be isolated cannot be confined to any set key frame structure, then you may need incremental key frames to isolate that focus object. This involves creating a key frame for focus object, moving forward or backward a set number of frames, and

establishing another key. Repeat this key frame pattern until the shape is sufficiently isolated or is no longer the shape in which it started.

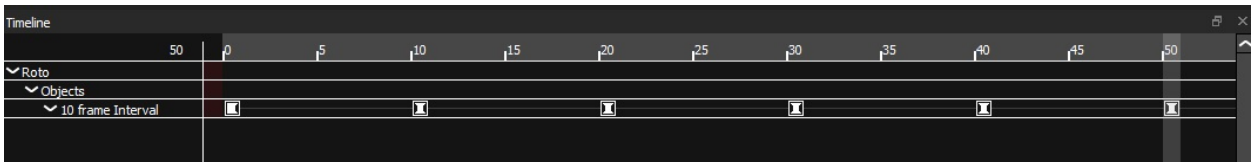


Fig. 4.25 Frame Interval (10 frames) Courtesy-Author

Practical Activity 4.2 – Animate the boat shape using incremental key-frame technique.

We will again take the same boat and animate its shape by using incremental key frame technique.

Step 1. In this technique, start animating frame from beginning. So, move viewer indicator to first frame (Figure 4.26).

Fig. 4.26 First Frame Courtesy-Author

Step 2. Now set the number of frames for frame incremental on frame steps. You can find frame steps on the right bottom of the viewer panel as shown in Figure 4.27. This time we will set 30 frame steps and press Enter.

Fig. 4.27 Set the Frame Steps Courtesy-Author

Step 3. Since you set 30 frame-steps, so as you press the X key the next frame will be 30 frames forward as shown in Figure 4.28.

Fig. 4.28 Move 30 frame forward Courtesy-Author

Step 4. Select transform tool (T) from tool panel as shown in Figure 4.29. A bounding box will show on viewer. Now you need to animate the shape according to focus object.

Fig. 4.29 Select Transform tool Courtesy-Author

Step 5. Go to corner of bounding box and hold Alt key to corner pinning the shape (Figure 4.30).

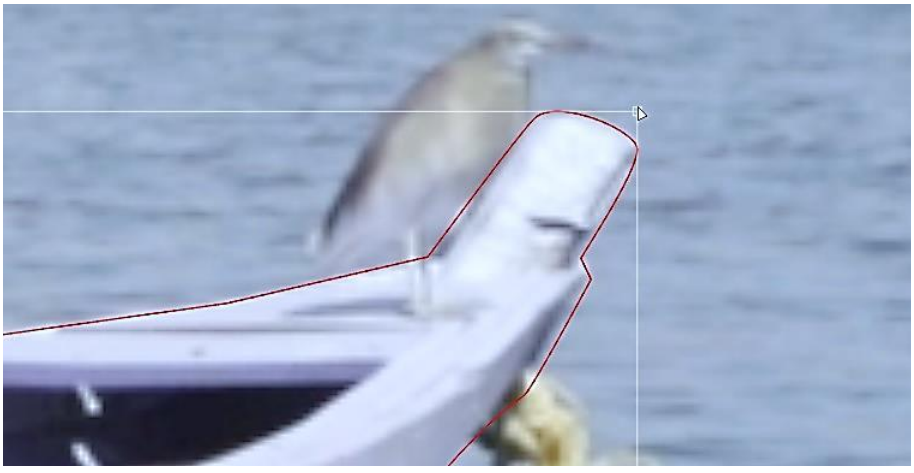


Fig. 4.30 Corner Pinning the Shape Courtesy-Author

Step 6. If required, select Reshape tool to modify the group of points (Figure 4.31).

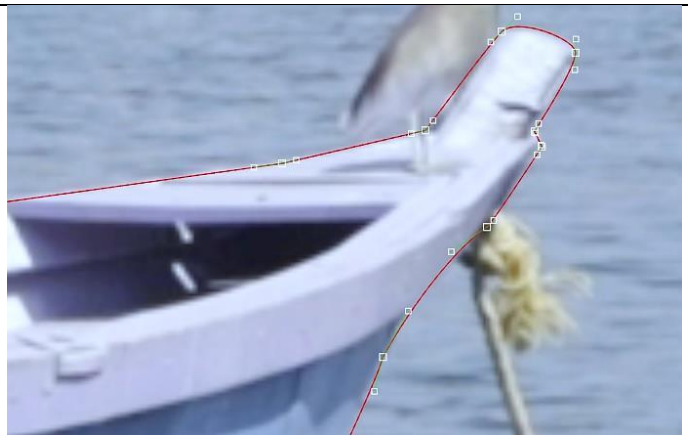


Fig. 4.31 Select Reshape tool to modify the Shape Courtesy-Author

Step 7. Once the shape adjustment is completed, Press X again to move 30 frames forward (Figure 4.32).

Fig. 4.32 Move 30 Frame backward Courtesy-Author

Step 8. Once the frame is forwarded, adjust the current frame using transform and reshape tool (Figure 4.33).

Fig. 4.33 Adjust the Frame using Transform and Reshape tool Courtesy-Author

Step 9. By using this method, you can forward the frame and adjust it.

Step 10. Once, you reached at the end frame. Go in between frame to adjust the shape movement according to focus object. You can also playback it frame by frame and make any adjustment you need.

Summary-

To animate any shape, you need Transform and Reshape tools.

Shape mode deals with the shape as a whole, while point mode allows you to manipulate small portion of the shape.

In Transform mode, you can move, nudge, scale, rotate, corner pin and shear the shape.

Use these three tools- Q (Move), W (Rotate) and E (Scale), to animate the shape quickly.

Anchor Point can be hidden or reveal by using (.) period key and the point can be moved by transform tool.

In Bifurcation technique, all the frames are divided in two parts and then modified.

You can set number of frame-step in incremental key frames.

Check Your Progress

A. Multiple Choice Questions

1. Transform tool is used to (a) Modify the control point (b) Animate the shape (c) Draw the shape (d) Track the shape
2. Transform tool divided in (a) Shape mode (b) Point mode (c) layer mode (d) Shape and Point mode
3. Keyboard shortcut of Shape mode is (a) T (b) TT (c) R (d) RR
4. Shape mode deals with_____ (a) Shape created with some control point (b) Shape as a whole (c) The control point individually (d)
5. When you working in a shape mode (a) A bounding box appear around the shape (b) A dotted line appears around the shape (c) A circle appears around the shape (d) A control handle appears on control points
6. In transform mode, move tool enables when place curser over the (a) Between two point in bounding box (b) Corner of bounding box (c) Centre of the bounding box (d) Outline of the shape
7. Using the Shift key in conjunction with the Arrow keys moves the shapes- (a) 1 pixel (b) 5 pixels (c) 10 pixels (d) 15 pixels
8. For Corner Pinning, select the corner point of the shape and (a) Hold Ctrl key (b) Hold Shift key (c) Hold Alt key (d) Hold Page Down key
9. A Shape rotates around its (a) Control Point (b) Anchor Point (c) Centre point of bounding box (d) Opposite control point

B. Fill in the blanks

1. Reshape tool is used to move _____ according to focus object.
2. Keyboard shortcut of Point mode is____.
3. Point mode manipulates _____of the shape.
4. In Point mode you need to select control point by using _____.
5. Scaling changes the _____.

6. To enable rotating hold down the _____on bounding box corner.
7. A shape rotates around its anchor point, but____ from the opposite handle.
8. Q, W and ____ are the combination of transform tool.
9. Timeline key-framing involves establishing key frames at_____ .
10. Creating a key frame for focus object, moving forward or backward in a set amount of frames is_____.

C. True or False

1. Transform tool is used to adjust the control point.
2. Shape mode is also known as Point mode.
3. Once you select the shape, you can modify it in both shape and point mode.
4. Shapes can be nudged horizontally or vertically using the Arrow keys.
5. You can activate and deactivate anchor point by (.) period key.
6. In bifurcation technique, we select the in-between frames.

D. Short answer questions

1. Write the use of Transform tool?
2. What is Shape Mode? Explain it.
3. What is Point Mode? Write its uses in animating shape.
4. How can you, (a) Rotate Shape (b) Corner-Pinning Shape
5. Write the use of Anchor Point.
6. Explain the transform tools, which are widely used while animating shape.
7. in which situation, you should use Key frame technique?
8. What is bifurcation key frame technique? Explain it with example.
9. When is the Incremental key frame technique used?

Module 2

Roto Techniques in SilhouetteFX©

Module Overview

Most of the time, you may encounter some kind of blur in the footage, when you begin rotoscoping. This is either due to depth of field blur or motion blur. In this unit, you will understand these two blur types and their differences. Further, you will understand various methods to handle these blurs while rotoscoping.

Tracker is a like a speed booster in rotoscoping. We will describe motion tracking and demonstrate the use of point, planer and mocha tracker.

Roto-artist spends their maximum time in human rotoscoping. It is tedious task to perform because of unpredictable human movement. So, we will take a glance about human anatomy, breakdown of human shapes, isolating human extremities such as arms, legs, feet and hands. Further you will understand the palm and finger isolation

methods. In addition, you will come to know about Inverse kinematics (IK), which helps to capture natural human movement.

Learning Outcomes

After completing this module, you will be able to:

- Understand how to apply blur and motion blur effects to enhance realism and movement in visual content.
- Describe the learn to track motion within footage to accurately integrate and synchronize visual effects.
- Develop skills in rotoscoping techniques specifically for human figures to ensure precise animation and visual integration.
- Demonstrate the techniques for rotoscoping complex elements such as hair to achieve natural and seamless results.

Module Structure

Session 1. Blur and Motion Blur

In last chapter, you have learned two important aspect of rotoscoping, i.e. drawing the shape and its movement. In rotoscoping, it is always challenging to create shapes or animating it, which have blur and motion blur. Before going deep in that, you need to understand the difference between these two.

In the first part of this chapter, you will understand about depth of field blur, which creates by the focal length of the camera. If the focal length remains same then amount of blur will be the same. But if the focal length changes, amount of blur will also be changed. In Figure 1.1, you can see the flower in focus while foreground and background are blurred or out of focus. This type of blur can be created by the focal length of the camera.

Fig. 1.1 Blur created from focal length of the camera Courtesy-Pixabay.com

While in other side, motion blur is slightly different from depth of field blur. Motion blur occurs when a focus object is in fast motion and camera is unable to capture all frames

as shown in Figure 1.2, where the ball is in motion and creating motion blur. Like in car racing or fighting scenes, if you are capturing the scene from your smart phone then definitely there will be a chance of motion blur except not using slow motion mode.

Basically, in Motion blur focus object travels a great distance over a short number of frames. The image blurs because the camera's shutter doesn't open and close fast enough to visually capture the moment.

While in other side, slow-motion footage is captured at a much higher number of frames per second. Thus it is not affected by motion blur because there are more frames to correctly capture the movement of the elements in the footage. Everybody have smartphone in their pocket with slow motion function. Motion blur is not uniform for complete footage; it depends upon the speed of the object while depth of field blur remains similar for complete shot.

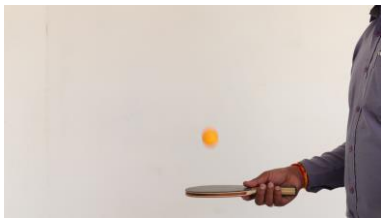


Fig. 1.2 Motion blur on table tennis ball Courtesy-Author

Assignment 1

Download or shoot a video clip and identify the difference between depth of field blur and motion blur.

1.1 Depth of Field Blur

Let us consider an object which has crispy sharp edge in the footage. Because most of time, there is a chance of edge blur. In the footage having some kind of blurriness, you have to blur your shapes, such that it can meet the focus object blurriness. This is your only target, when you roto any blur object. So first, find the blur setting that matches the object blurriness and second, keep that amount for the whole duration.

Let us recall quickly, where you get this blur setting? When you create spline, it displays on object list while its control shows on object window, as shown in Figure 1.3.

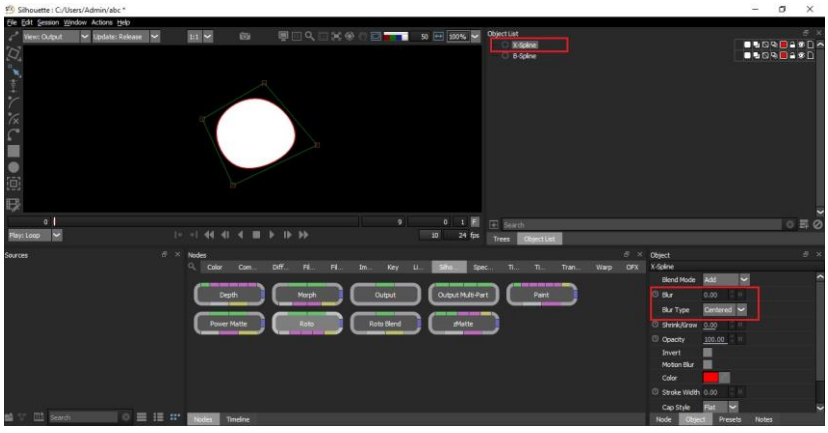


Fig. 1.3 Spline blur setting Courtesy-Author

When using the mattes, compositor should know how much blur to apply to the mattes. As long as you keep your spline consistent with the edge of the focus object, the compositor will have the ability to blur that shape as per the requirement.

Consider the Figure 1.4 (a) & (b). Here we will try to isolate the person, who is sitting on foreground. Observe that the plant is crisp and clear on this video however the man is out of focus. To isolate the man from the frame, we are going to create a shape which has the same amount of blur as the frame has.

Fig. 1.4 (a) Footage Courtesy-AuthorFig. 1.4 (b) Focus edge Courtesy-Author

Practical Activity 1.1– Create a shape for face having same amount of blurriness.

Step 1. Create a project in SilhouetteFX©v7.1. Import footage and create a new session as shown in Figure 1.1. Insert roto node between source and output node.

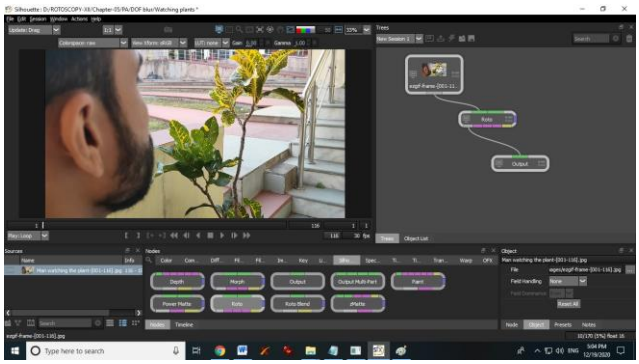


Fig. 1.5 Create a session Courtesy-Author

Step 2. Select the X-spline and create shape into his face. When creating shape, reference to the edge and edge blur of focus object is very important. Once you get the position, keep it in same relative position further.

Step 3. This spline has been placed on the extreme edge of the blurred focus object. It means that without any blur attached to the spline; the matte would appear solid, having no gradient at its edges. In Figure 1.6 (a) – (d) From a distance this spline looks great and seemingly isolates the focus object.

Fig. 1.6 (a) Footage

Fig. 1.6 (b) Spline positioned at extreme ends of blur object

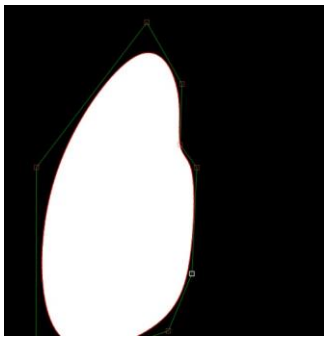


Fig. 1.7 (c) Overlay matte **Fig. 1.7 (d) Alpha matte**

Step 4. When you zoom in the focus object, you can see that solid edge of the shape does not accurately match with the gradient edge of the focus object, as shown in Figure 1.8 (a). If you compare the edge gradient then the footage has gradient in cream colour, while in alpha channel and matte overlay, there is no gradient as shown in Figure 1.8 (b).

Fig. 1.8 (a) Comparison of Edge **Fig. 1.8 (b) Gradient in the edge Courtesy-Author**

Step 1. Now, to make this alpha matte more accurate, you have to use spline control to blur the edge of this spline. Since, we have placed the spline at the extreme end of the blur as shown in Figure 1.6 (b). So, set the blur type as Inner, to apply the blur effect inward as shown in Figure 1.9 (a), (b) & (c).

Fig. 1.9 (a), (b) & (c) Spline controls Courtesy-Author

By using spline blur setting, we are going to match the gradient of the focus object with shape. For this, we will compare, where the focus object gradient begins and ends to the correlating edge gradient of the spline.

Step 6. With an edge blur of 5 in Figure 1.10 (a), the blur doesn't match the focus object. When, you increase blur value to 7 pixels, it become closer, but not accurate to compare the focus object edge gradient as shown in Figure 1.10 (b). If you compare between these two values, you will find that this spline needs a 10-pixel blur to accurately isolate the focus object, as shown in Figure 1.10 (c).

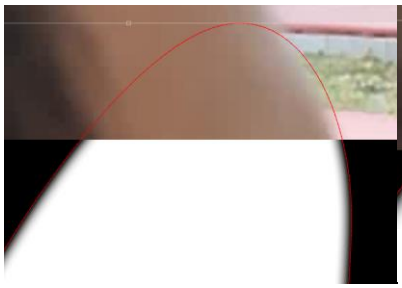


Fig. 1.10 (a) 5 Pixel inner blur

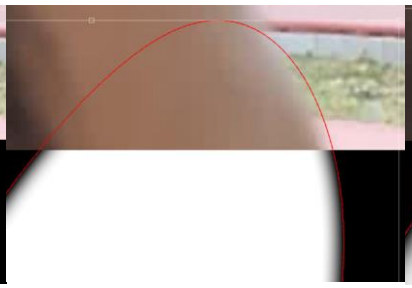


Fig. 1.10 (b) 7 Pixel inner blur

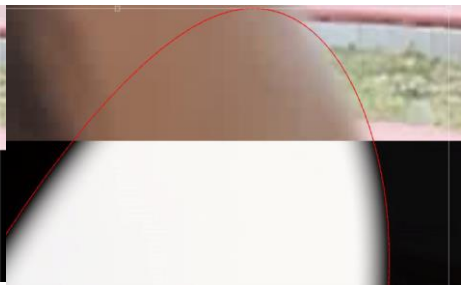


Fig. 1.10 (c) 10 Pixel inner blur

If you want to check whether the blur is correct, place the pointer where the blur on the footage begin and end. After that, toggle between alpha channel and footage. This allows to check whether the edge blur of matte matches the footage edge blur.

If particular rotoscoping program doesn't allow you to control the direction the blur will affect the spline. You have to find the spline placement that will correctly emulate the edge blur of the focus object. You need to figure out how your roto program of choice handles spline blur and compensate appropriately.

Choosing how the blur affects the spline will seriously control how you place the spline on the blurred focus object. The values in Fig. 1.11 are pumped up to a 30-pixel blur to show the differences between the types of edge blur that can be applied to shape.

Outer – This setting will make the matte 100 percent visible starting on the outside of the spline, and then gradually, over the amount of blur setting, it will become 0 percent visible.

Centered – This blur setting will keep the pixels along the spline's edge 50 percent visible.

Inner – The spline will be 0 percent visible at the spline, and then the head will gradually become more visible as we go inward on the spline.

Once it is established the appropriate blur that will accurately reflect the edge of the focus object, you need to keep your spline at the same distance from the focus object edge for the life of the spline.

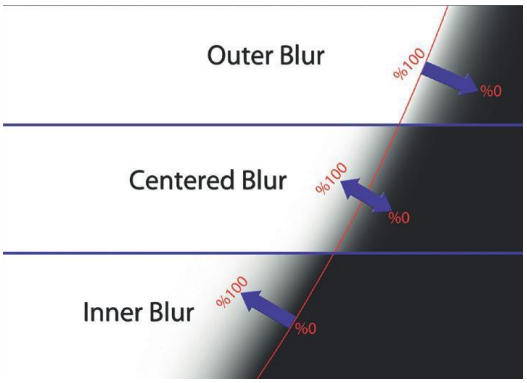


Fig. 1.11 Comparison of Outer, Centered and Inner blur Courtesy-Author

Assignment 2

Capture a video with depth of field blur by using a smartphone or DSLR camera. Create a shape over it using SilhouetteFX© software and match its blur with focus object's blur.

1.2 Motion Blur

Motion blur is different from blur achieved by focal length. It is the result of camera shutter. In motion blur, you don't rely on spline control, as in focal length blur. Here you need to control the blur by the edge feather.

As you know that the Edge feather is created by the feather handle and displayed as dotted lines as shown in Figure 1.12 (a), (b) & (c).

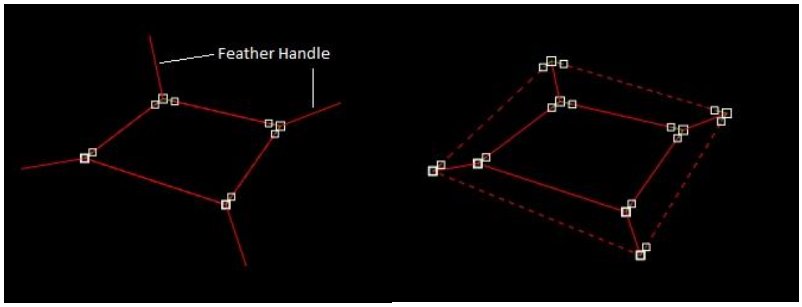


Fig. 1.12 (a) Feather handle

Fig. 1.12 (b) Feather in dotted line

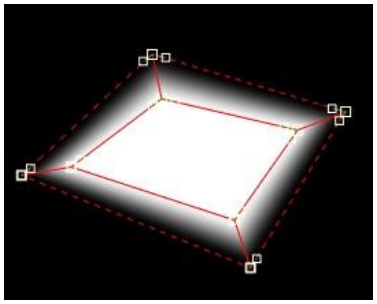


Fig. 1.12 (c) Alpha channel

Applying motion blur to the mattes you create is useful, if these mattes are accurately isolating the focus object. Isolating a focus object with high motion blur without including the graduated edges would make the mattes nearly impossible to use. This is something all roto artists must deal with on a pretty consistent basis.

Table 1.1 Comparison between Depth of Field blur and Motion blur

	Depth of Field blur	**Motion blur**
Created by	Camera lens	Slow shutter speed
Effected by	Focal length of lens, aperture and object distance	Object speed
Impact	Cinematic, artistic	Suspense, thriller
Example	Close-up of flower, Extreme close-up shots	Action sequences, fast moving cars

Practical Activity 1.2 – Create a matte for motion object.

Step 1. Import the video frames in SilhouetteFX©v7.5 as shown in Figure 1.13. Select **File> Import> media** to import the video frames.

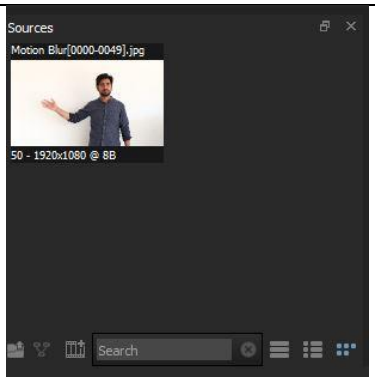


Fig. 1.13 Import Footage Courtesy-Author

Step 2. Select **Session> New session** to create a new session. Name the session and click on **OK** button (Figure 1.14).

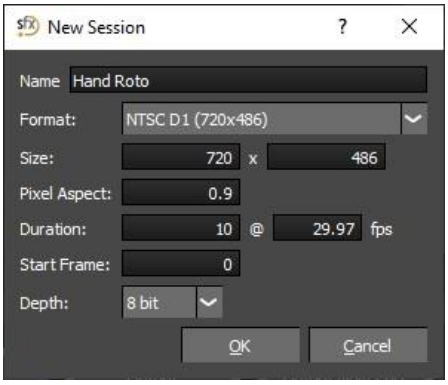


Fig. 1.14 New Session Dialog box Courtesy-Author

Step 3. Session is formed in trees window. Here you can observe the interface of the software as shown in Figure 1.11.

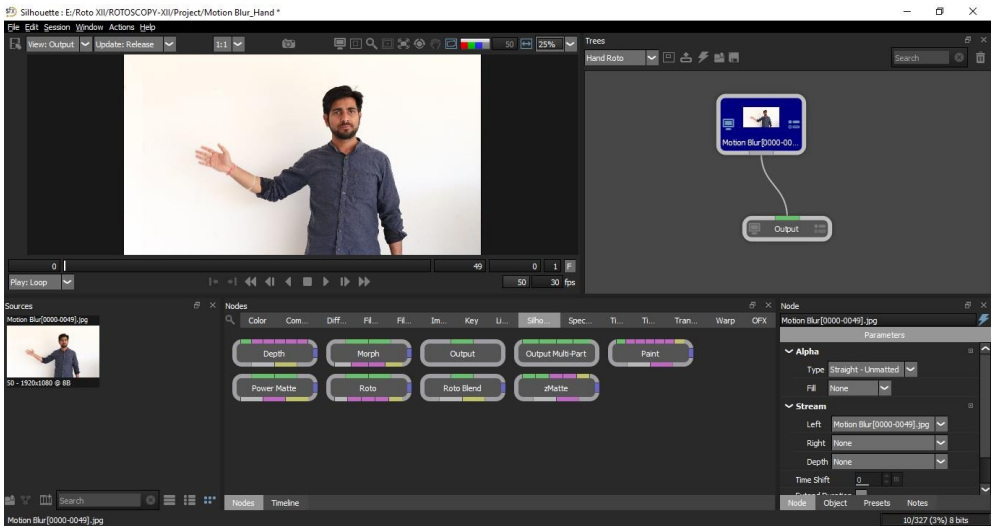


Fig. 1.15 Session is created Courtesy-Author

Step 4. To perform rotoscoping, find the roto node into Node window. Insert it between object and output node as shown in Figure 1.16.

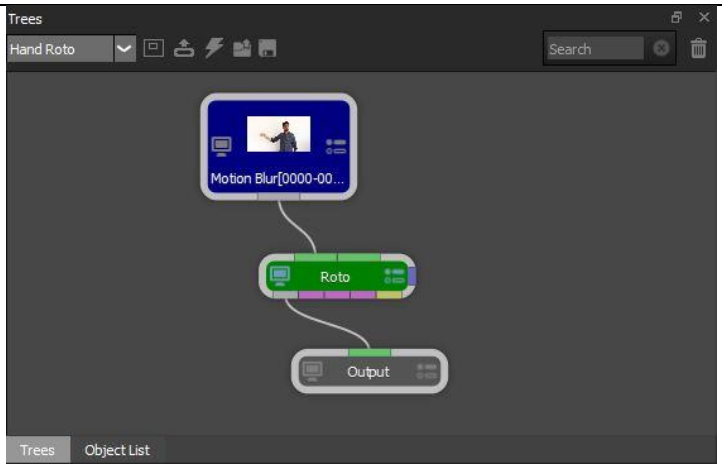


Fig. 1.16 Insert Roto Node Courtesy-Author

Step 1. Press F3 to maximize viewer, Playback video frame on viewer panel. Focus on object sharpness and shape. Find the frame which you are going to start Roto. We found 14th frame as shown in Figure 1.17, appropriate to start the roto.

Fig. 1.17 Find out the appropriate frame to start roto Courtesy-Author

Use L, K and J key respectively to Play, Pause and Reverse video on viewer's panel.

Step 6. Now press = key to **zoom in** to the palm as shown in Figure 1.18.

Fig. 1.18 Magnify the Palm Courtesy-Author

Step 7. To roto the object, select the Bezier tool as shown in Figure 1.19, from tool bar.

Fig. 1.19 Bezier tool

Step 8. Try to break the focus object in to multiple shapes. You can breakdown in to the finger, palm and hand as shown in Figure 1.20.

Fig. 1.20 Breakdown the focus object in multiple shapes Courtesy-Author

Step 9. Once roto work is completed, you should check the shape's outline in overlay and alpha view as shown in Figure 1.21. For this, Press A for Overlay view and AA for Alpha view.

Fig. 1.21 (a) Overlay View

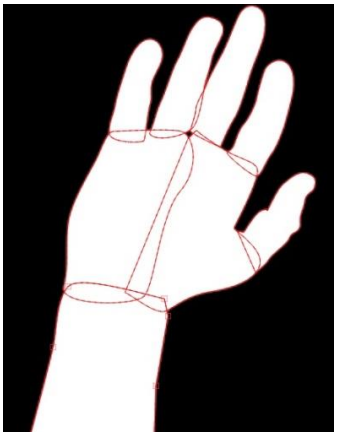


Fig. 1.21(b) Alpha View Courtesy-Author

Step 10. Press numeric Key 4 for Color comp view (Figure 1.22) and numeric key 0 to hide the outline of shape. Now view the output. Decide is there any requirement of the edge feather. If yes, then enable feather control.

Fig. 1.22 Colour Comp View Courtesy-Author

Step 11. Select feather handle in spline as shown in Figure 1.23 and use required feathers on the shapes. Feather can be viewed as a dotted outline in the shape.

Fig. 1.23 Select Feather Handle (Red dotted line) in Spline Courtesy-Author

Step 12. Now see this Colour Comp output by pressing Numeric Key 4 (Figure 1.24). You can compare it with Figure 1.23.

Fig. 1.24 Colour Comp View Courtesy-Author

Step 12. You can see in timeline that we are rotoscoping in frame 15 as shown in Figure 1.21.

Fig. 1.25 15th Frame Courtesy-Author

Step 13. Now use incremental key frame technique and set 5 frame intervals in Frame-steps as shown in Figure 1.26.

Fig. 1.26 Set Frame interval Courtesy-Author

Step 14. Press **Z** to move the frame backwards by 5 frames (Figure 1.27). Here you can see that object has moved while the shape is still in the last position.

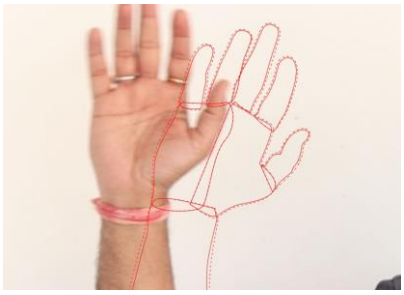


Fig. 1.27 Move Backward Courtesy-Author

Step 11. Select the Shape transform (T) tool and rotate the shape as shown in Figure 1.28.

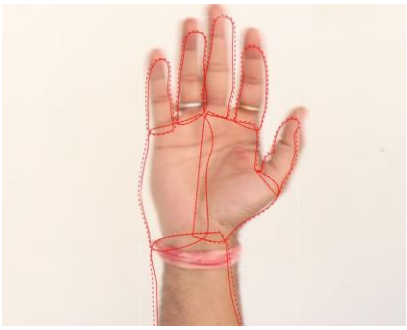


Fig. 1.28 Rotate the shape Courtesy-Author

Step 11. Select the individual shape separately and adjust it using transform tool as shown in Figure 1.29. Keep remember Q, W, E for Move, rotation and scale. You can also use corner pinning.

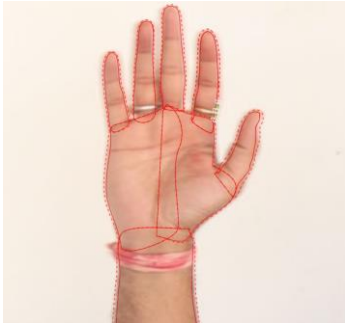


Fig. 1.29 Modify the shapes Courtesy-Author

Step 16. Now you need to adjust the shape using reshape tool and feather edge by adjust feather handle as shown in Figure 1.30.

Fig. 1.30 Adjust the Shape using Reshape tool Courtesy-Author

Step 17. Again move 5 frames backward (Figure 1.31) which is frame number 5 and modify the shape.

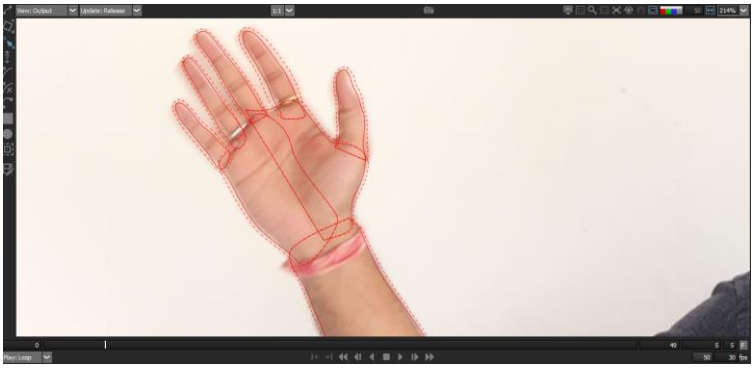
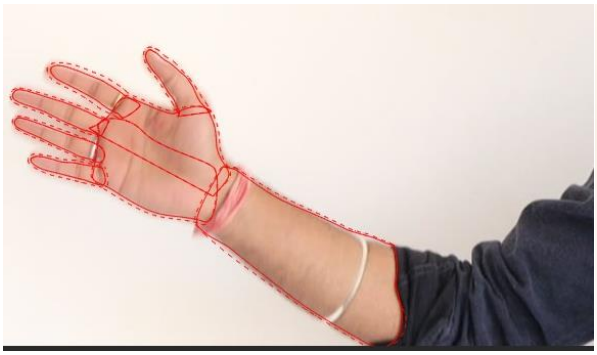


Fig. 1.31 Move 5 frames Backward Courtesy-Author

Step 18. By using incremental key frame technique, you have roto 1st, 5th, 10th and 15th frame. Observe this in Figure 1.32.



1st Frame

5th Frame

10th Frame

15th Frame

Fig. 1.32 Modification in Different Frames Courtesy-Author

Now adjust in between frames and complete the rotoscoping of the hand. By using, incremental key frame technique, you can adjust the shapes which have motion blur easily.

Summary

Blur is of two types- Depth of field blur and Motion blur.

Camera blur is created by the focal length while motion blur occurs when the object is in the fast motion and camera is unable to capture it.

Watch the motion of the object carefully as you start and start working with the frame with have highest detail.

As we did in the practical activity, try to transform whole shape using the transform tool like move, rotate and scale, before start editing individual point.

Keep the control points of your shape on the same part of the object all of the way during the shot.

Keep checking your work with the solid overlay view, by pressing numeric key 4.

Check Your Progress

A. Multiple Choice Questions

1. Depth of field blur is created by (a) Focal length of the camera (b) Motion of the object (c) Video effect from software (d) Focusing ring of the camera
2. Motion blur occurs when a focus object moves (a) Great distance over a large number of frames (b) Great distance over a short number of frames (c) Minimum distance over a large number of frame (d) Minimum distance over a short number of frame
3. You will get blur setting in (a) Object list (b) Object window (c) Tools (d) Timeline
4. Without any blur attached to the spline, the matte would appear (a) Solid (b) Blurry (c) Solid with gradient in edge (d) Transparent
5. Centered blur setting keep the pixels_____ visible along the spline's edge (a) 25% (b) 50% (c) 75% (d) 100%
6. Edge feather can be controlled by (a) Focal Length (b) Feather Handle (c) Edge Feather (d) Spline

B. Fill in the blanks

1. If the focal length remains same then amount of blur will be _____.
2. Slow-motion footage is captured at _____ number of frames per second.
3. There is always a chance of_____ blur in the footage which you are rotoscoping.
4. To isolate the edge blur from the frame, you need to create the same amount of_____ as the frame has.
5. When spline was placed at the very extreme blurred edge of the focus object, set the blur to affect _____.
6. Centered blur setting will keep the pixels along the spline's edge_____ visible.
7. Press A for Overlay view and _____ for Alpha view.
8. You can watch_____ output in viewer by pressing numeric key 4.

C. True or False

1. If you roto the blur object, then your job is to match the blurriness of the object with shape.
2. If you want to check whether your blur is correct, then place the pointer where the blur on the footage begins.
3. You need to keep your spline at that same distance from the focus object edge for the life of the spline.
4. Press F2 for maximize viewer.
5. Numeric key 0 is used to hide the outline of shape.

D. Short answer questions

1. What is depth of field blur? Explain the technique of rotoscoping of this type of blur.
2. What is motion blur? How is this different from depth of field blur?
3. How can you adjust the blurriness of the shape with object?
4. Compare outer, centered and inner blur.
5. Explain the use of different blur setting with suitable example.
6. How can you match shape's blur with focus object?

Session 2: Motion Tracking

Roto-artist always searches a quickest and most straight forward path to extract focus object. It is largely frame by frame work. If you find any path to create an accurate matte without manually creating key frames for your shapes, you definitely want to try those methods.

Tracking any elements of footage and attaching these tracking data to shapes can speed-up the workload. When you follow an element of a video clip, the resulting track gives horizontal and vertical data of that element. This tracking data is translated by the computer into X and Y coordinates that can be applied to any shape.

In this chapter, you will be able to perform tracking on SilhouetteFX© software. There are three types of tracker in SilhouetteFX©– Point Tracker, Planer Tracker and Mocha planer tracker. However, Planer Tracker and Mocha planar tracker are considered into same group of tracker.

2.1 Motion Tracking

It is the process of tracking the movement of an object and applies it over a piece of footage. Once you get these tracking data from the selected point, you can apply it over other elements or objects. After applying tracking data over the object, its movement matches with footage movement. Initially, it is used in compositing to incorporate some element in scene which is not there.

Fig. 2.1 Concept of Motion Tracking

2.1.1 Use of Motion Tracking

It is important to note that where you can use motion tracking technique. Let us take a quick look to know some important use of motion tracking.

- Stabilize motion by utilizing tracking data.
- Add elements such as text or solids to a composition.
- Track a shape/mask over a moving target in rotoscoping.
- Insert 3D computer generated objects into 2D footage.
- Use in wire and rig removal.
- Replace screens on a TV, Computer, or mobile device.

These are just a few things, where motion tracking is used. From simple to complex compositions, this is a technique which you must know.

2.2 SilhouetteFX© Motion Tracking

In SilhouetteFX©, there are three motion tracking options.

- Point Tracker
- Planer Tracker
- Mocha Planer Tracker

Generally, SilhouetteFX© planer tracker and mocha planar tracker are counted under same category of planar tracker.

2.2.1 Point Tracker

In Point tracker, the area which is going to track is specified by track points in the layer panel. It offers one, two, three and even multiple point tracking. Some biggest advantages of using point tracker are-

1. It is a 2D tracker. That is mostly used on inorganic shapes like chair, ball, car etc.
2. It allows to choose any feature to track in a scene.
3. It is most flexible and versatile tracker.

Each point tracker contains (i) Match Area, (ii) Search Region and (iii) track point. In Combination, these three are called a “Tracker” as shown in Figure 2.2.

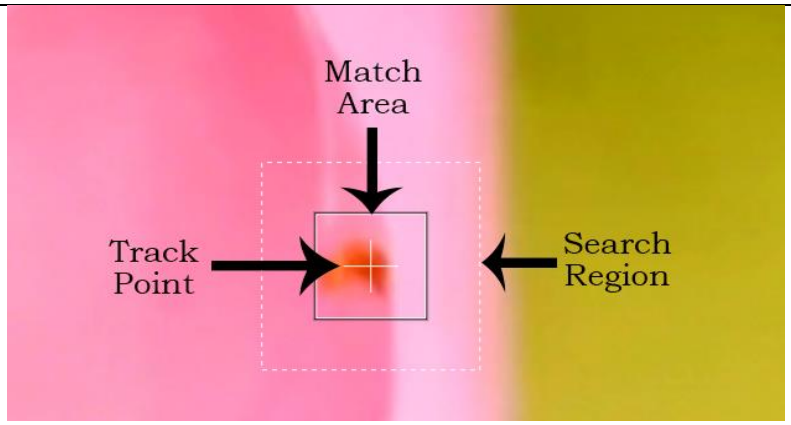


Fig. 2.2 Tracker Courtesy-Author

Track Point – It is the actual point of tracking. In this point, the target layer or effect control point will be placed. By default, this is positioned at the center of the Feature Region, but can be moved, if needed.

Match Area – It define the element in the layer that is about to be tracked. Keep in mind, that it should be clearly visible in whole duration of the track, even if the background, light and camera angle have been changed.

Search Region – It is the area, which search to locate the tracked feature. It is like the boundary of the ball. The element you are tracking should not go beyond this region. Keeping search region small will result faster tracking, but there is a risk of the tracked feature leaving the search region between frames.

Know More...

Feature is the point within the object, which is used by the tracker. It may be any dot point in cricket ball, logo in a car and even any colour contrast differences.

2.2.1.1 Creating One Point Tracker

Track any single feature of the object in horizontal (x-axis) and vertical (y-axis) position, with little or no perspective change on the image. You can use this tracking information to move other elements during compositing.

Now let us create Point tracker on the image frames.

Practical Activity 1 – Create a single point tracker.

Step 1. Open SilhouetteFX© software, Import footage, create session and insert roto node in trees window as shown in Figure 2.3.

Fig. 2.3 Create a session Courtesy-Author

Step 2. Click on Roto Node on Tress window and Select the Tracker (Shift-T) in the Toolbar as shown in Figure 2.4.

Fig. 2.4 Tracker Courtesy-Author

Step 3. Go to the frame as shown in Figure 2.5, from where you want to start tracking.

Fig. 2.5 Find suitable frame for tracking Courtesy-Author

Step 4. Set the view to Foreground as shown in Figure 2.6 for the fastest speed when tracking. In the Foreground view, no processing occurs and therefore it is faster than **View > Output.**

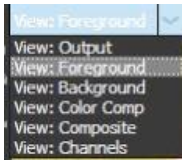


Fig. 2.6 View setting Courtesy-Author

Step 5. Tracker window is located at the bottom of the screen; select the Point Tracker tab, as shown in Figure 2.7

Fig. 2.7 Point Tracker tab Courtesy-Author

Step 2. Press the Create button and place a tracker in the center of the image as shown in Figure 2.8.

Fig. 2.8 Create a point tracker Courtesy-Author

Step 7. Click Alt at open space in the image. A magnify view appears as shown in Figure 2.9 to find out the perfect element for tracking.

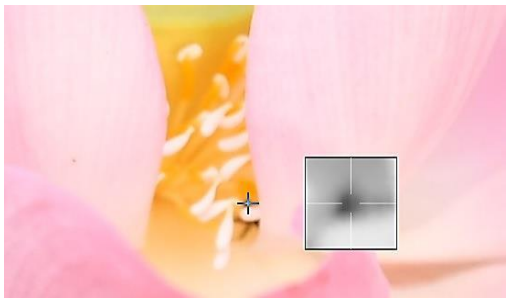


Fig. 2.9 Tracking point Courtesy-Author

Step 8. Once you find the tracking element, click left mouse button for creating tracker as shown in Figure 2.10.

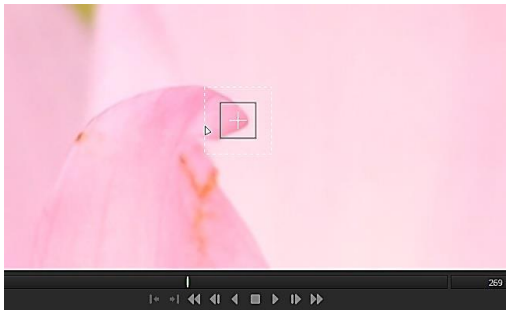


Fig. 2.10 Create track point Courtesy-Author

After creating the tracker, you have to adjust it according to match area.

2.2.2 Moving and Scaling Tracker component

As you know, tracker has three component – Track point, match area and search region. Sometimes you need to move the tracker at desired point and even scaling of tracker is required in some cases.

Following are the steps for moving the tracker component.

Step 1. Click exactly on the center of the Track point as shown in Figure 2.11 and drag it. It will move all the components of the Tracker: Match Area, Search Region and Track Point simultaneously.

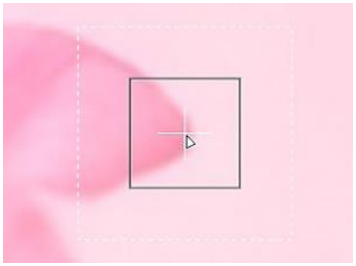


Fig. 2.11 Clicking and dragging the center point of tracker Courtesy-Author

Step 2. Clicking and dragging within the area of the Match Area will move both the Search Region and Match Area simultaneously as shown in Figure 2.12, though only the track point will not move. This can be used for Offset Tracking when the original track point becomes obscured.

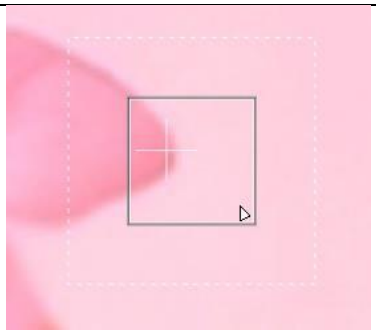


Fig. 2.12 Clicking and dragging within the area of the Match Area Courtesy-Author

Step 3. Clicking and dragging within the area of the Search Region will move only the Search Region as shown in Figure 2.13.

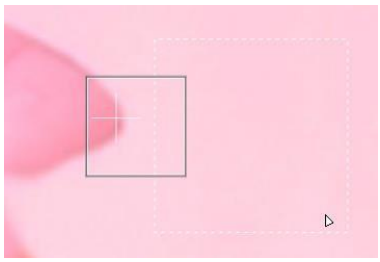


Fig. 2.13 Clicking and dragging within the area of the search region Courtesy-Author

After moving the tracker, sometimes scaling is also required.

Step 4. Clicking and dragging on the corners of the Match Area bounding box. It scales both the Match Area and Search Region as shown in Figure 2.14.

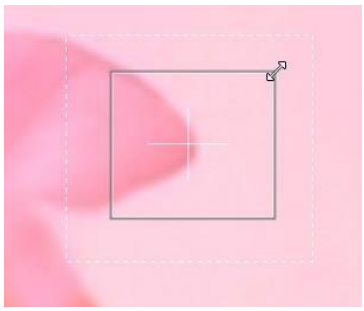


Fig. 2.14 Clicking and dragging on the corners of the Match Area

Step 5. Clicking and dragging on the corners of the Search Region bounding box scales only the Search Region as shown in Figure 2.15.

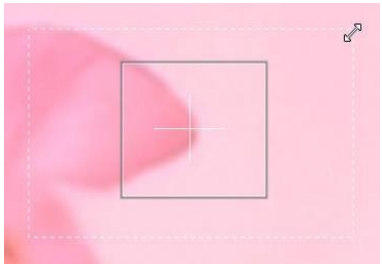


Fig. 2.15 Clicking and dragging on the corners of the Search Region bounding box

2.2.3 Pre-Processing the Object

Once you select the feature region for tracking, you have the option in tracker to pre-process the object with respect to contrast, sharpness, gamma, blur and noise by using video filters as shown in Figure 2.12. Keep in mind, it will not affect video clipping rather use to increase accuracy for tracking object.

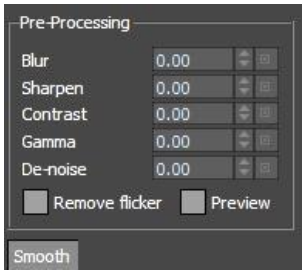


Fig. 2.16 Pre-processing option Courtesy-Author

Let us use pre-processing over the object and understand the properties of each filter. For better result, right check on preview box as shown in Figure 2.17 (a) to show the result on viewer.

Blur – It applies the blur over the image features as shown in Figure 2.17(b).

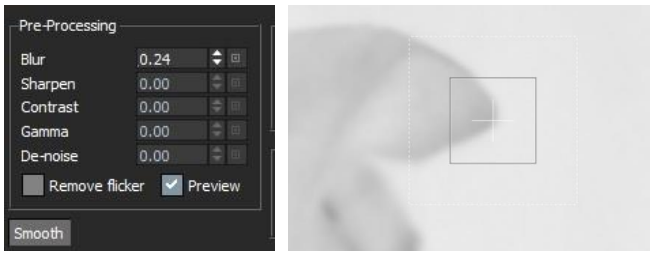


Fig. 2.17 (a) & (b) Blur setting and its impact on object Courtesy-Author

Sharpen – It sharpens the image features, as shown in Figure 2.18.

Fig. 2.18 (a) & (b) Sharpen setting and its impact on object Courtesy-Author

Contrast – increase the contrast of image features, as shown in Figure 2.19 (a). The result is shown in Figure 2.19 (b).

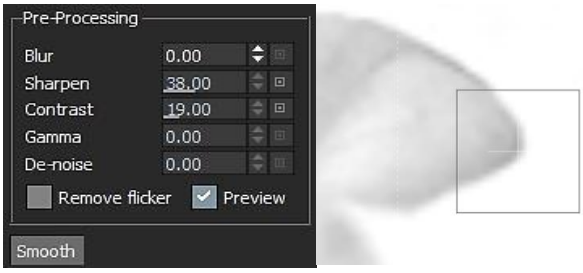


Fig. 2.19 Contrast setting and its impact on object Courtesy-Author

Gamma – It increases the brightness, as shown in Figure 2.19 (a). The changes will be affected in-between value of black and white points as shown in Figure 2.19 (b).

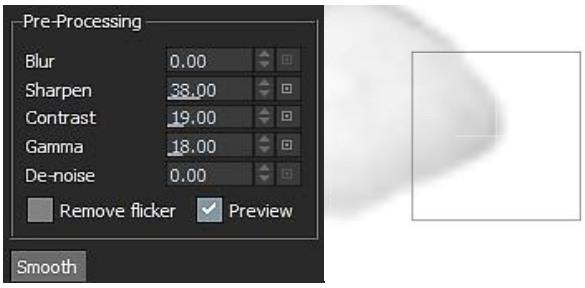


Fig. 2.20 Gamma setting and its impact on object Courtesy-Author

De-noise – smooth out the noise while retaining the details.

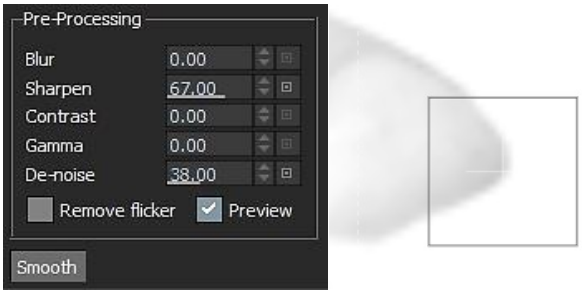


Fig. 2.21 De-noise setting and its impact on object Courtesy-Author

Remove Flicker – It corrects image flicker or brightness variation of the image.

Preview – It displays the pre-processing changes in the viewer.

Smooth – It is used to smooth out tracking data.

2.2.3 Tracking an Image

After pre-processing the tracking features, you need to track the image. For this the various controls are used in Point tracker tab, as shown in Figure 2.22.

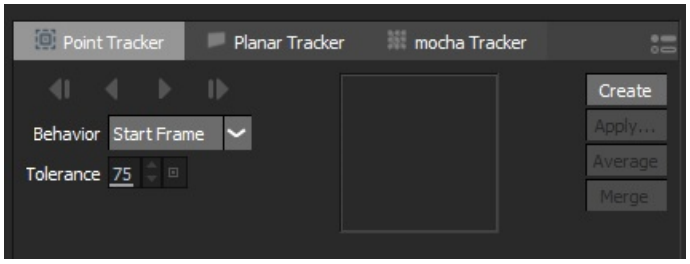


Fig. 2.22 Different option in Point Tracker Courtesy-Author

Create – A new tracker can be created into the center of the viewer by pressing create button. You can also create a new tracker by pressing Alt key on keyboard.

Apply – After tracking the data, you need to apply it into the layer. Select layer, and click on Apply button, a match-move dialog box opens, as shown in Figure 2.23. Here you can determine how tracking data will be applied over footage.

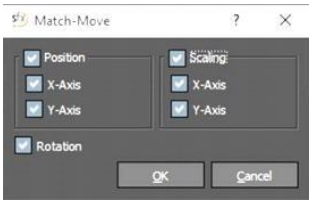


Fig. 2.23 Match move dialog box Courtesy-Author

Average – Averages multiple tracks into a new destination track. A common technique is to track forwards from the first frame to the last, and then create a second track,

tracking backwards from the last frame to the first. These two trackers are then averaged together to derive a more accurate track. To average trackers, select more than one tracker and click the Average button. A new averaged tracker is created.

Merge – If you have multiple trackers that cover different frame ranges, they can be merged into one tracker, automatically compensating for the different offsets.

Behavior – Behavior decides the reference frame to check the accuracy of match area (Figure 2.24).

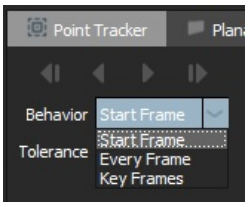


Fig. 2.24 Behavior options Courtesy-Author

Start frame – The match area is compared with starting frame.

Every frame – The match area is compared with previous frame.

Key Frames – In the difficult shot, it is better to set key frames initially for tracker, at various point of the clip. The match area is used it as reference.

Tolerance – It describes the level of accuracy between the Match Area that the Tracker is searching for and area it actually finds when searching from frame to frame. A perfect match will have value of 100, while default value of tolerance is 75 (Figure 2.25).

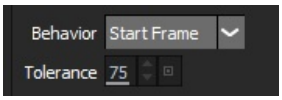


Fig. 2.25 Tolerance Courtesy-Author

Tracking option – The tracker can track both forward and backward one frames at a time or can track for entire duration, as shown in Figure 2.26.

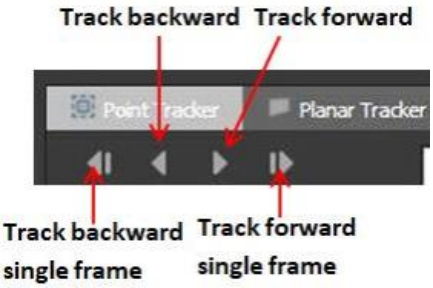


Fig. 2.26 Tracking option Courtesy-Author

Practical Activity 2.2 – Track the object by using one-point tracking feature.

Step 1. Adjust the size and position of the Match Area and Search Region as shown in Figure 2.27.

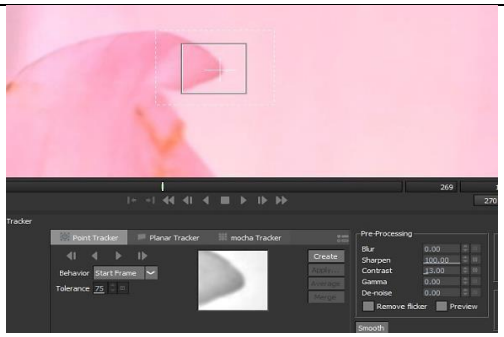


Fig. 2.27 Adjust the position of match area and search region Courtesy-Author

Step 2. Right click on the tracker. Select the color space to use in the Channel sub menu as shown in Figure 2.28.

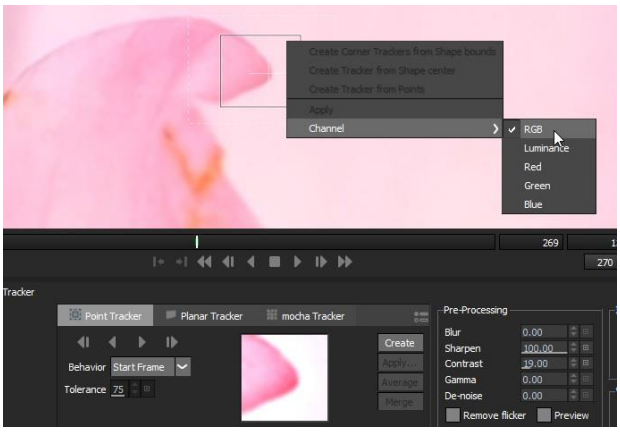


Fig. 2.28 Select the colour space Courtesy-Author

Step 3. Hit either the forward or backward track button. Software will analyze the motion for each frame in the clip as shown in Figure 2.29.

Fig. 2.29 Hit tracking button Courtesy-Author

Step 4. After clicking the track forward/backward button, SilhouetteFX© automatically track the image. Tracking data is shown in the form of green lines as shown in Figure 2.30.

Fig. 2.30 Tracking data is showing in green line Courtesy-Author

Step 5. Now create a shape over image as shown in Figure 2.31 by using X-Spline tool as shown in Figure 2.31.

Fig. 2.31 Shape layer is created Courtesy-Author

Step 2. Select tracker in tool panel and also in object list. Now Point tracker tab will open as shown in Figure 2.32 (a) & 2.32 (b).

Fig. 2.32 (a)

Fig. 2.32 (b) Tracker tool and its position into object list

Step 7. In Point tracker tab, click on Apply button, which match the tracking data with shape as shown in Figure 2.33.

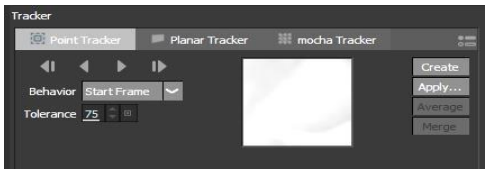


Fig. 2.33 Click on Apply button on Point Tracker tab Courtesy-Author

Step 8. After clicking on **Apply** button, a match move dialog box opens. Check the necessary options as shown in Figure 2.34 and click **OK**.

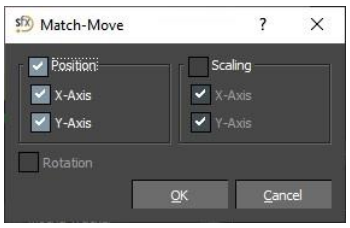


Fig. 2.34 Match move dialog box Courtesy-Author

Step 9. Now the shape starts moving according to the object.

Know More...

You can apply point tracker data only to the layer, not directly to the shape. So put the shape into the layer and then use tracking data.

2.2.1.2 Two Point Tracker

There is no difference in process between single point tracker and two point tracker. The only difference is that there are now two trackers. Two point trackers track not only the position but also scale and rotation. It is very useful when camera is panning or shots have any kind of rotation or perspective.

Let us illustrate to use two point Tracker using the Practical Activity 2.3.

Practical Activity 2.3 – Demonstrate to use two point Tracker.

Step 1. Import image sequence in SilhouetteFX©v7.5 as shown in Figure 2.35. Create session and insert roto nodes between source and output node in Trees window.

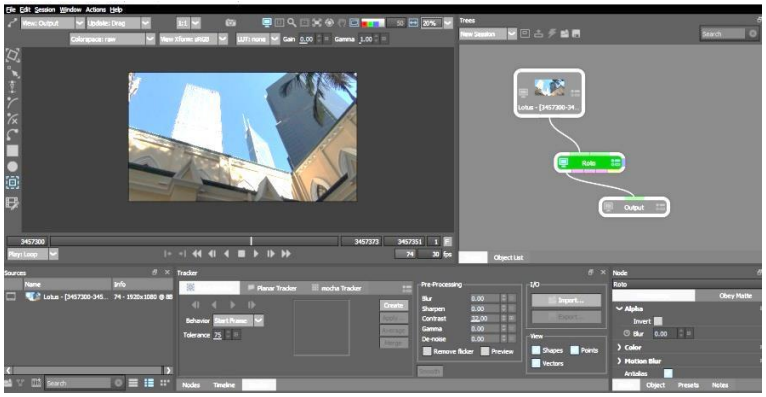


Fig. 2.35 Import video-clip and create session Courtesy-Author

Step 2. Click on tracker into roto tools, which opens Tracker window. Here, select Point tracker tab as shown in Figure 2.36.

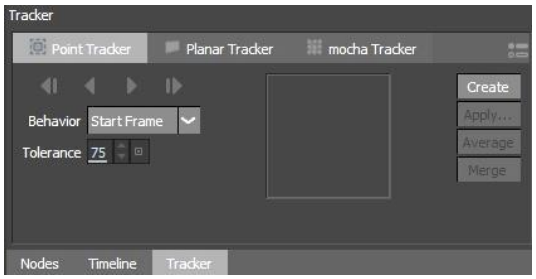


Fig. 2.36 Point tracker tab Courtesy-Author

Step 3. Click on create button, a tracker will appear on the viewer panel as shown in Figure 2.37. Set the tracker in appropriate place and adjust its various regions.

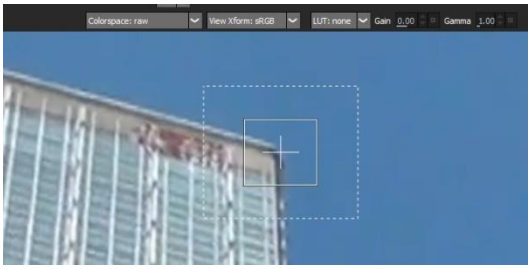


Fig. 2.37 Set the tracker Courtesy-Author

Step 4. Create another tracker in the bottom part of the object as shown in Figure 2.38.

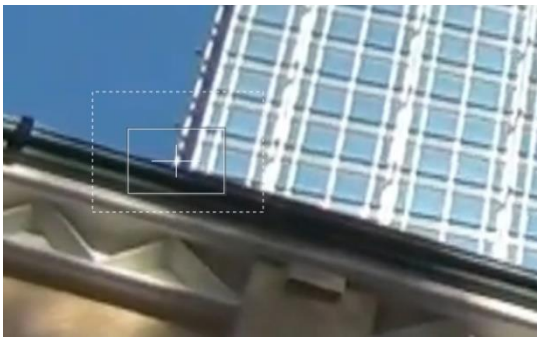


Fig. 2.38 Create second point tracker Courtesy-Author

Step 5. Select both tracker in object list and Track forward/backward by pressing forward/backward button in point tracker tab as shown in Figure 2.39 (a) & (b). Track information has been saved in green line form.

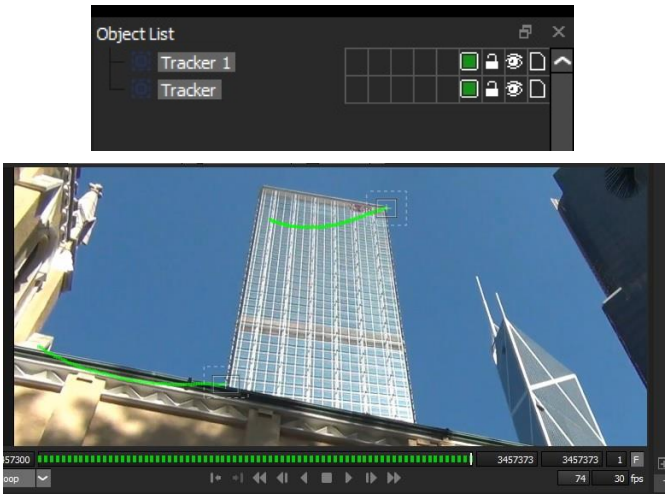


Fig. 2.39 (a) & (b) Select both tracker in object list and track Courtesy-Author

Step 5. Now create a shape of object and put it into the layer as shown in Figure 2.40 (a) and (b). Always keep tracker above the layer.

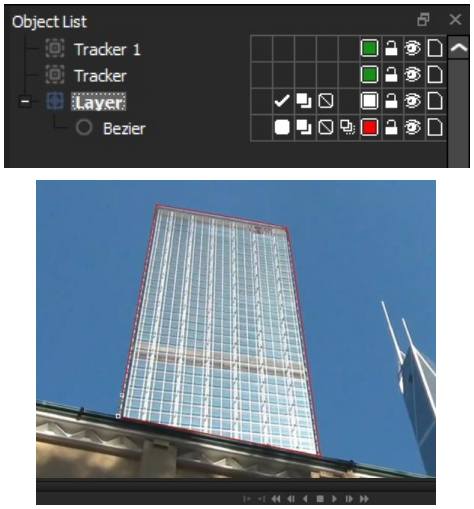


Fig. 2.40 (a) & (b) Create shape of object Courtesy-Author

Step 2. Now select both trackers in object list and click on **Apply** button on Point tracker tab as shown in Figure 2.41.

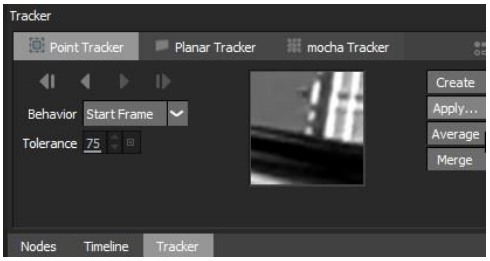


Fig. 2.41 Apply the tracker in both shapes Courtesy-Author

Step 7. As you click on Apply button, a match move dialog box appears as shown in Figure 2.42. Here two more options are enabling with existing one – rotation and scaling. Tick the entire checkboxes and click on **OK** button.

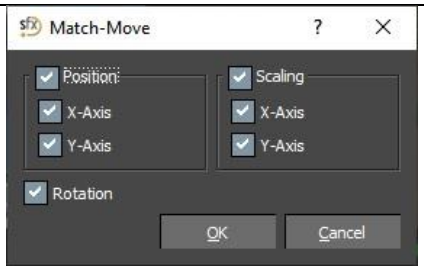
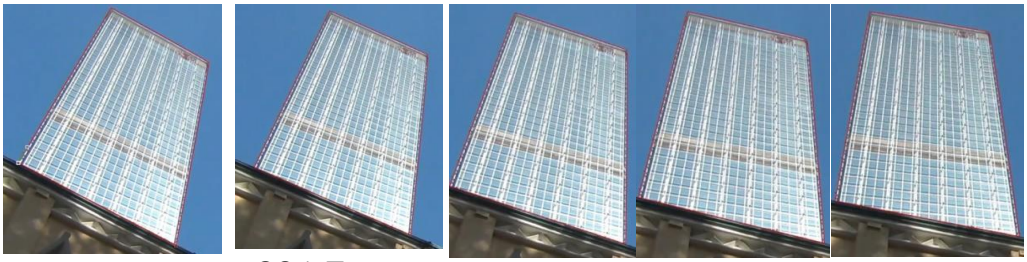


Fig. 2.42 Match move dialog box Courtesy-Author

Step 8. Once tracking data is applied over shape, observe the movement of the shape, which is now, synchronize with video footage as shown in Figure 2.43.



1st Frame **20th Frame** **40th Frame** **60th Frame** **Last Frame**

Fig. 2.43 Observe the movement of the shape Courtesy-Author

Step 9. Modify the shape at any frame to match the movement of object.

Assignment 1

Shoot a rotate video footage from your mobile/DSLR and track and isolate the object by using two point tracker.

2.3 Planer Tracker

Planar tracker means tracking over any X, Y plane such as roads, walls and many more. SilhouetteFX© includes two types of Planar Trackers: (i) Silhouette's Planar Tracker and (ii) Imaginer's mocha Planar Tracker.

The workflow is same for both the planar tracker. If you want to get accurate tracking data from it, then learn to find planes of movement in the video clip and that plane should fit with the object, which you want to track.

Sometimes it will be obvious; otherwise you may have to break your object into different planes of movement.

Most notably, both Planar Trackers require a layer in the object list and have at least one shape within it to move the tracker.

> **Know More...**
>
> The Tracker is available as a separate node, but is also built into the Depth, Morph and Roto nodes.

2.3.1 How Planar Tracking Works

A planar tracker takes advantage of the fact that there are flat planes all around us in the man-made world of floors, walls and streets, and even in the natural world of desert, lake and sky. You can watch different planes in the row houses buildings as shown in Figure 2.44. Planar tracker uses these planes for calculations.

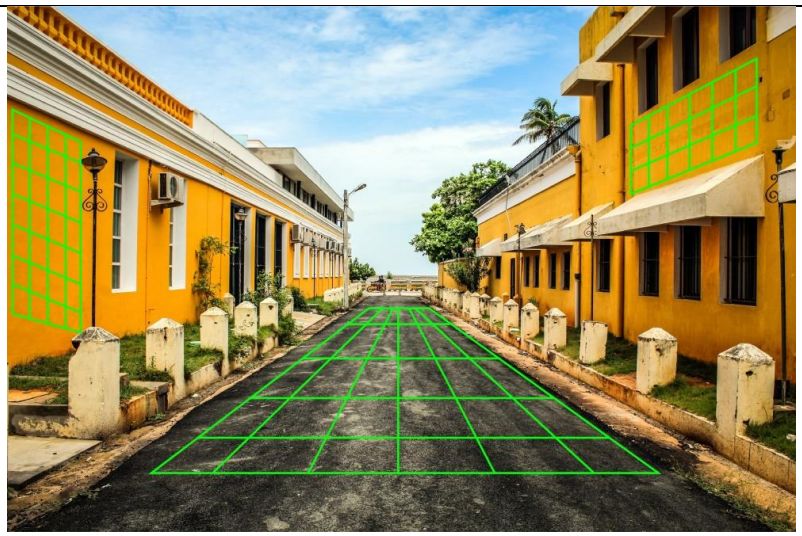


Fig. 2.44 Different Planes Courtesy-Sri aurobindo ashram

First create a shape over the plane to identify it to planar tracker. After this, planar tracker compares the texture of the entire plane, frame by frame to track its movement in the frame. It utilizes the fact that the texture is a flat plane to optimize the tracking calculations to match the texture for translate, rotate, scale, skew, and perspective. Since planar tracker is seeking much larger image area than point tracker thus there is less chance that tracker will be lost path due to noise, dark images, variable light condition, obstructions and motion blur.

SilhouetteFX©'s Planar Tracker

As mentioned earlier, it tracks planes and surfaces instead of point. You get the following options while using Silhouette planar tracker, which shows as a planar tracker as shown in Figure 2.45.

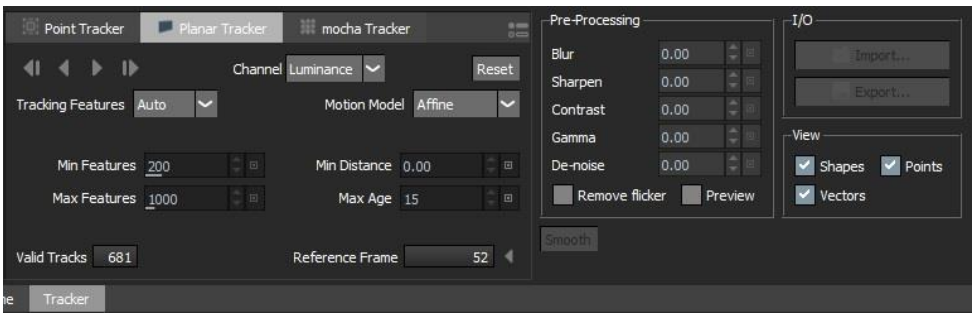


Fig. 2.45 SilhouetteFX©v7.5 planar tracker Courtesy-Author

Planar Tracker Tab

Channel – Here you can select the specific channel for planar tracker as shown in Figure 2.46.

Fig. 2.46 Channel Courtesy-Author

Tracking Features – It helps the tracking points, where they will place. For example, if you select corner tracking feature, then most of feature shifted into the corner of a shape as shown in Figure 2.47.

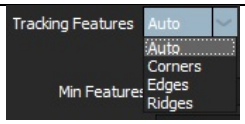


Fig. 2.47 Tracking features Courtesy-Author

Motion Model – It is related to the motion of the object, for instance if the object have X and Y axis movement then select Translation option, if the object also has slight movement in Z axis then select Affine option, while if it has larger perspective change then select perspective option in motion model as shown in Figure 2.48.

Fig. 2.48 Motion model Courtesy-Author

Min Features – It generates the minimum number of trackers, as shown in Figure.

Max Features – It generates the maximum number of trackers, as shown in Figure.

Min Distance – It decided the minimum distance between trackers.

Max Age – The maximum number of frames, a specific tracker will live.

Valid Tracks – It shows the total number of trackers available in current frame, as shown in Figure.

Reference Frame – It displays the reference frame number.

Track options – Tracker direction button is used to track backward and forward, as shown in Figure 2.49.

Fig. 2.49 Tracking option Courtesy-Author

Practical Activity 2.4 – Track the object by using SilhouetteFX©'s planar tracker.

Step 1. Import some source footage and create a session as shown in Figure 2.50. In Trees window, add Roto node between source and output.

Fig. 2.50 Import the footage and create session Courtesy-Author

Step 2. Select the frame in viewer as shown in Figure 2.51, where you want to start tracking. In this footage, we will prefer last frame, which have maximum detail in object.

Fig. 2.51 Find the appropriate frame for tracking Courtesy-Author

Step 3. Planar tracker can be applied into the layer only, so create a layer in the Object List using the **Add Layer** icon as shown in Figure 2.52.

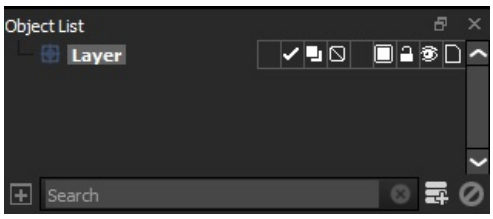


Fig. 2.52 Create a layer into the object list Courtesy-Author

Step 4. In this footage, we are going to track river side building. For this, create a shape around the object inside a new layer to track as shown in Figure 2.53. Remember, shape should include some details of the object. Keep little extra room around the object.

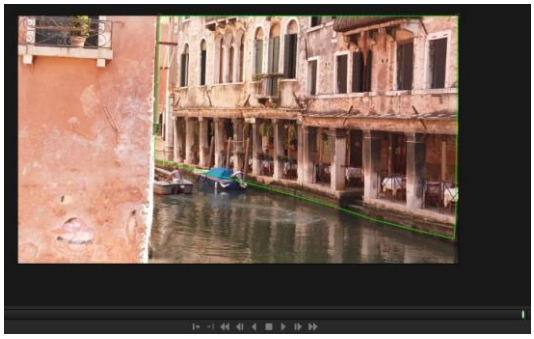


Fig. 2.53 Create a shape into the layer Courtesy-Author

Step 5. Choose the Tracker by Shift-T key in the Toolbar.

Step 2. Select Planar Tracker in the Tracker tab located at the bottom of screen, as shown in Figure 2.54.

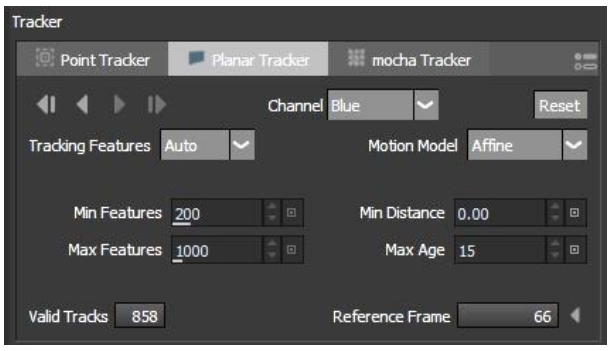


Fig. 2.54 Select planar tracker Courtesy-Author

Step 7. Selecting planar tracker, lot of tracking features in red colour start displaying inside the shape, as shown in Figure 2.55.

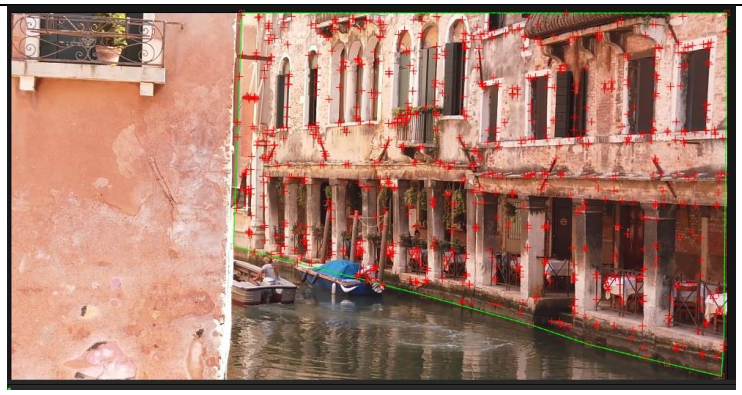


Fig. 2.55 Tracking features in red colour Courtesy-Author

Step 8. To track the object, click on track forward/backward button into planar tracker tab, as shown in Figure 2.52. With this, either you can track a single frame or complete frame at once.

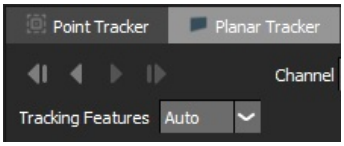


Fig. 2.56 Track the object Courtesy-Author

Step 9. Now tracking is started, as shown in Figure 2.57.

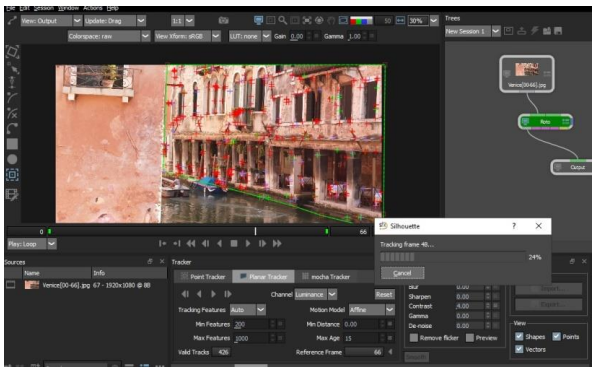


Fig. 2.57 Tracking is started Courtesy-Author

Step 10. Press L key and Playback it on viewer to observe the accuracy of tracking.

Step 11. Tracking data can also be observed by selecting stabilize tool in viewer panel and selecting Active Layer, as shown in Figure 2.58.

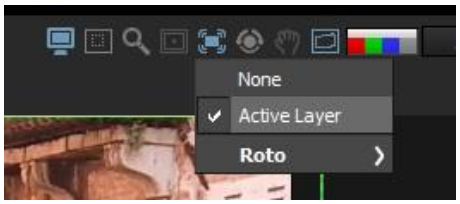


Fig. 2.58 Selecting Active Layer Courtesy-Author

Step 12. Now, keep the cursor at any point in the shape as shown in Figure 2.59, and playback the footage. Observe the cursor, if there is no change in footage placement then tracking is perfect.

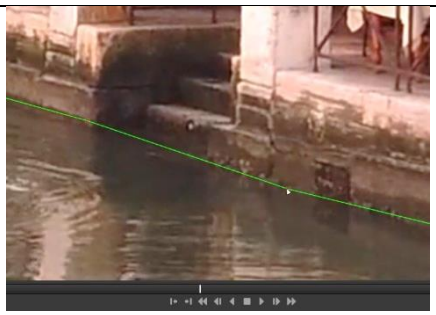


Fig. 2.59 Keep the cursor at any point of shape Courtesy-Author

Step 13. After this, select none in stabilize option, as shown in Figure 2.60.

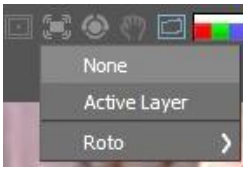


Fig. 2.60 Deselect stabilize option Courtesy-Author

Step 14. Now you can add many shapes into this tracking layer, if the shape is placed on same geometric plane.

Mocha Planar Tracker

Mocha tracker is available within SilhouetteFX© tracker options. Setting up the mocha tracker is similar to setting another tracker especially planar tracker as shown in Figure 2.61.

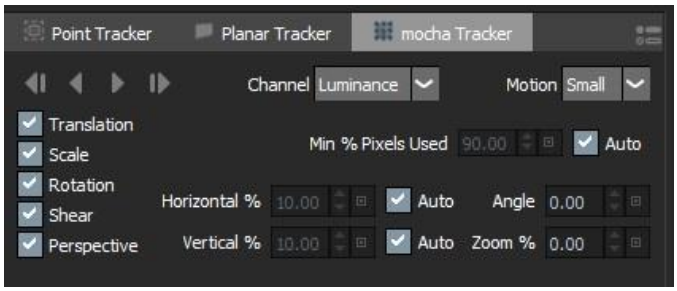


Fig. 2.61 Mocha Tracker Courtesy-Author

When you select Mocha planar tracker in SilhouetteFX©, you get following options.

Channel – It determines which image channel tracker use to analyse the image. There are four channels available – luminance, red, green and blue.

Motion – You can control motion parameters during track.

Fig. 2.62 Motion option Courtesy-Author

Translation – It determines the X and Y position of an object.

Scale – It determines the size of the object.

Rotation – It determines angle of the object.

Shear – It skews the object along with camera movement.

Perspective – It determines how the object is moving in perspective relative to the camera.

Horizontal/Vertical % – It determines the distance in pixels within the footage to search for next object position.

Angle – If object is fast moving, and then set an angle of rotation to help the tracker to lock the detail correctly.

Zoom% – You can set percentage value fast zooming object.

Practical Activity 2.5 – Track the object by using Mocha Planar Tracker.

Step 1. Import some footage in SilhouetteFX©. Create a session and insert roto node between Source and output node in Trees window, as shown in Figure 2.63.

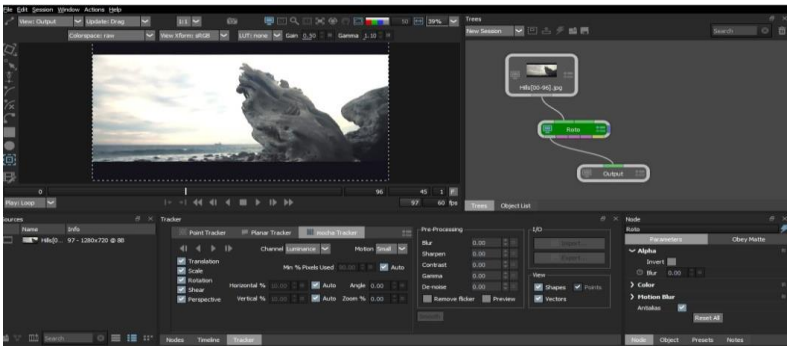


Fig. 2.63 Create a new session Courtesy-Author

Step 2. Create a layer into object list.

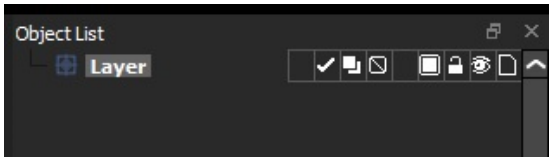


Fig. 2.64 Layer is created into object list Courtesy-Author

Step 3. Now identify the frame that has complete shape and detail. Draw a shape over object in that frame. Keep this shape into the layer.

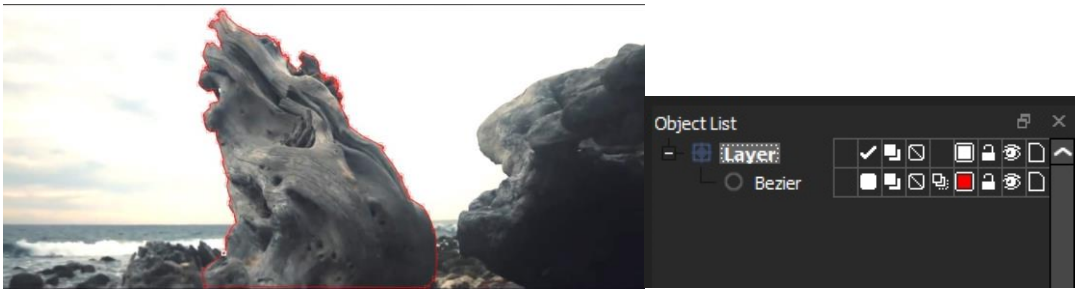


Fig. 2.65 (a) & (b) Create shape into the layer Courtesy-Author

Step 4. Select Tracker on toolbar and click on mocha tracker tab into the Tracker window, as shown in Figure 2.62.

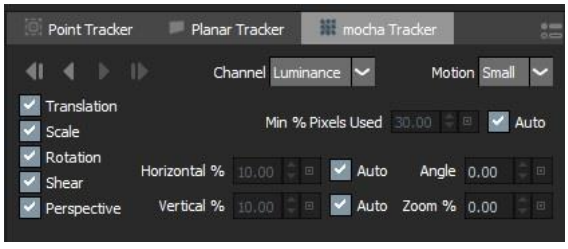


Fig. 2.66 Select various option in mocha tracker Courtesy-Author

Step 5. Here, you need to select various options like channels, motion, translation, scale, rotation, shear and perspective and then click on tracking option button.

Step 2. Once you track an object, make some correction and use it for rotoscoping (Figure 2.66).

Fig. 2.67 Correction on shape after tracking

2.3.3 Use of Planar Tracking

Like a point tracker, the tracking data generated by the planar tracker can be used in a wide variety of ways.

2.3.3.1 Motion Tracking

Similar to point tracker, motion tracking can be used to move one object to lock another object and move with it. Tracking data generates transformations, which is a description of the movement of an object in the image made up of translation (vertical and horizontal movement), rotation, scale, skew, and perspective. These transformations can be used to animate a graphic object like a logo to appear to stay locked to a moving object in the frame.

Fig. 2.68 Motion tracking Courtesy-Author

2.3.3.2 Corner Pinning

In some situations, just knowing the transformation is not enough. You also need to have the information about the corners of the source image. Further These corners will replace frame by frame. For example, replace the video clip of a monitor by using this technique as shown in Figure 2.69.

This is what corner pinning is all about. The tracking data is converted into the location of each of the four corners of a moving video monitor. For example, the source image is “corner pinned” to the monitor’s corners frame by frame. Some other uses of corner pinning are, tracking a picture into a picture frame or placing an outdoor scene through a window.

Fig. 2.69 Corner pinning Courtesy-Author

2.3.3.3 Stabilizing

The transformation data generated by the planar tracker can also be used to stabilize a plate just as with a point tracker. While they do output exactly the same type of transformation data (translate, rotate, scale) the virtue of the planar tracker is its ability to lock onto more difficult targets.

2.3.3.4 Rotoscoping

Planar trackers are also a very useful tool to assist with rotoscoping. There are many objects that are planar in the real world, and many others are not. Consider the human form, one of the most common rotoscoping targets. Surprisingly, the planar tracker will still get a good lock on a non-planar surface such as a face or hand. This tracking data can be applied to the roto shape. Through this a large part of the work being done by the machine.

Summary

Motion Tracking is the process of tracking the object and applies this data over a piece of footage or shapes.

There are three motion tracking options in SilhouetteFX – Point Tracker, Planer Tracker and Mocha Planer Tracker.

In Point Tracker, the tracking area is specified by Track point in layer panel.

Point Tracker has three component – Track point, match area and search region.

Select the Foreground view for the fastest tracking.

Two-point tracker is used when camera is panning or shots have any kind of rotation or perspective.

Planer tracker tracks over the surface which have X and Y plane such as roads, walls.

CHECK YOUR PROGRESS

A. Multiple Choice Questions

1. Which of the following tracker is not found in SilhouetteFX (a) Point tracker (b) Planar tracker (c) Camera tracker (d) Mocha tracker
2. Motion tracking is used in (a) Compositing (b) Editing (c) Video shooting (d) Colour grading
3. Point tracker is mostly used in (a) Organic shape (b) Inorganic shape (c) Simple shape (d) Complex shape

4. The element that track point does not contain (a) Match area (b) Search region (c) Track point (d) Match point
5. By using one-point tracker, you can track any single feature of the object in (a) Horizontal axis (b) Vertical Axis (c) Both Horizontal and vertical axis (d) Z axis
6. Tracker window is located at the _____ of the screen (a) Left (b) Right (c) Top (d) Bottom
7. Pressing a 'create' button in Point tracker tab, the tracker is created on the ____ of the image (a) Center (b) Top right (c) Top left (d) Bottom
8. Pre-processing change in viewer is displayed, when you click on ____ into pre-processing (a) Display (b) Viewer (c) Preview (d) Composite
9. Planar tracker compares _____ of the entire plane to track the movement (a) Contrast (b) Noise (c) Colour (d) Texture

B. Fill in the blanks

1. Motion tracking is the process of _____ the movement of an object.
2. Motion tracking can be used to_____ motion by utilizing tracking data.
3. Point tracker is a _____ tracker.
4. Set the View to _____ for the fastest speed, when tracking.
5. In tracker, Clicking and dragging within the area of the_____ will move only the Search Region.
6. De-noise smooth-out the noise while retaining the_____.
7. Two point tracker is used when the shot have any kind of rotation or _____.
8. Planar tracker requires a layer in the_____.

C. True or False

1. Motion tracking is not used in wire and rig removal.
2. Track point is the actual point you are tracking.
3. You can decrease contrast of the object by using pre-processing into the tracker.
4. Behavior decides the reference frame to check the accuracy of match area.
5. Scaling and rotation is not available in single point tracking.

D. Short answer questions

1. What is motion tracking?
2. Write the use of Motion Tracking.
3. What is Point Tracker? When should you use Point Tracker?
4. Explain match area, track point and search region.
5. Write the use of pre-processing tab into the tracker?
6. Where can we use two-point tracker?
7. What is Planar Tracker?
8. How Planar Tracker works?
9. When should you use Planar Tracker?
10. What is mocha Planar tracker?
11. Write the use of Mocha Planar Tracker?

Session 3: Human Figure based Rotoscoping

A Rotoartist spends their maximum time to isolate human figures, because in most cases the focus object is the human being. For this you need to create mattes which can isolate them from rest of the footage. Human roto is a tedious task because human doesn't move in a linear way. Therefore, you need to breakdown complete human figure in to the smaller shapes.

3.1 Understand the human movement

It is essential to understand the human movement. Figure 3.1 shows the various position of human movement while walking.

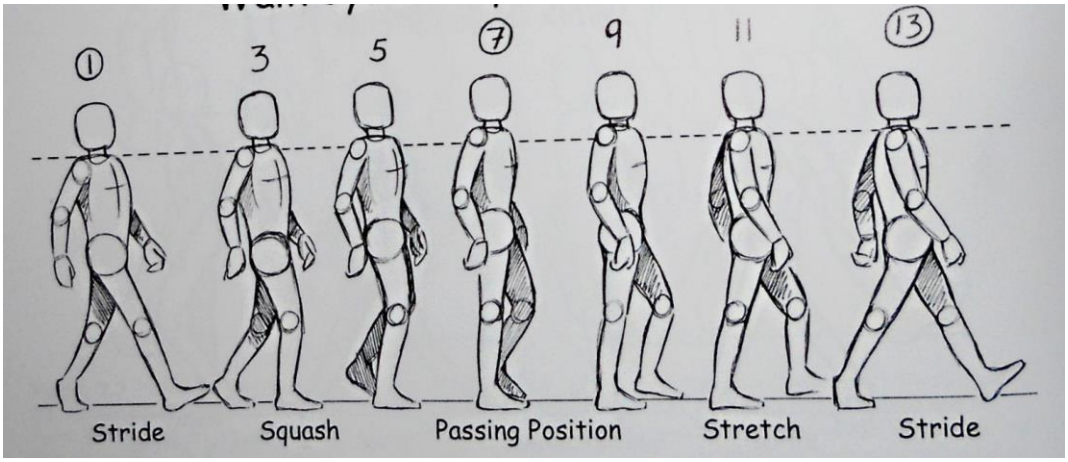


Fig. 3.1 Walk Cycle; Keys and in between Courtesy-Author

Have you ever seen the puppet game show? The puppeteer shows the game by playing with puppet. There are similarities between puppet game and human roto, as both are based on human movement.

In Human figure rotoscoping, it is essential to know the movement of human hands, fingers and legs. So before starting human rotoscoping, just watch the video footage again and again. Here you need to work in two steps.

Differentiate shape based on their movement.

Define the motion path of each individual sub-shape. For this disable all shapes and focus on a single shape at once.

Fig. 3.2 Side poses of person moving Courtesy-Author

In Figure 3.2, observe that a person is moving in a screen and your task is to isolate human shape from the footage. If you playback this video in a loop then you can focus

on movement, and breakdown it into different shape as shown in Figure 3.3. Let's find out some measure movement from this footage.

Fig. 3.3 Different sidewalk position Courtesy-Author

In Figure 3.3, if you concentrate on person's movement then you can easily divide it into the different shapes. It helps in isolating specific shape/edge of your focus object. Now a person can be divided in to different shapes based on movement.

1. Head and chest
2. Right Upper Arm
3. Right Lower arm
4. Right palm and fingers
5. Left Palm and fingers
6. Upper left leg
7. Lower left leg
8. Toes

The breakdown of focus object into multiple shapes is shown in Figure 3.4.

Fig. 3.4 Rotoscoping of man Courtesy-Author

Assignment 1

Study the movement of following organic shape.

1. Human 2. Horse 3. Deer 4. Kangaroo

Remember the following while performing human rotosocoping.

1. Take a single shape at a time.
2. Roto this shapes until it stop being an edge.
3. Once this shape is finished, move to another shape.

4. You can choose any shape to roto but never leave it in middle just finish it.

So, you can take left lower leg from Figure 3.4 and perform the rotoscoping.

Practical Activity 3.1 – Rotoscoping left leg of the person.

Step 1. To roto the left upper thigh, disable all shape except this, as shown in Figure 3.5.

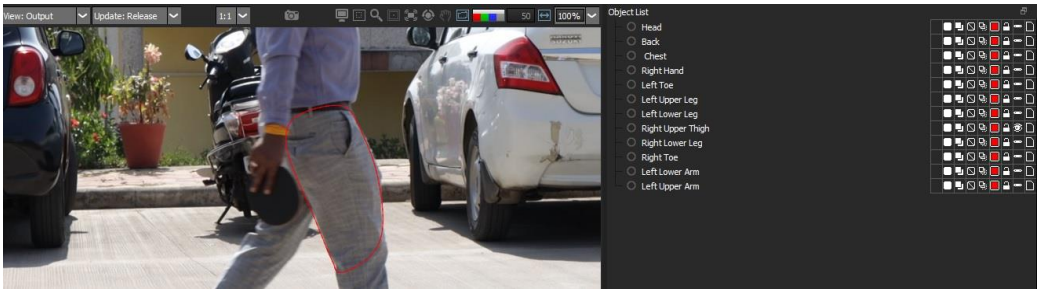


Fig. 3.5 Disable all the shape Courtesy-Author

Step 2. For animating the shape according to object, set 10 frame intervals into the frame-steps as shown in Figure 3.6.

Fig. 3.6 Set Frame-steps Courtesy-Author

Step 3. As you forward the footage 10 frames, you can see the shape is still in their last position, as seen in Figure 3.7.

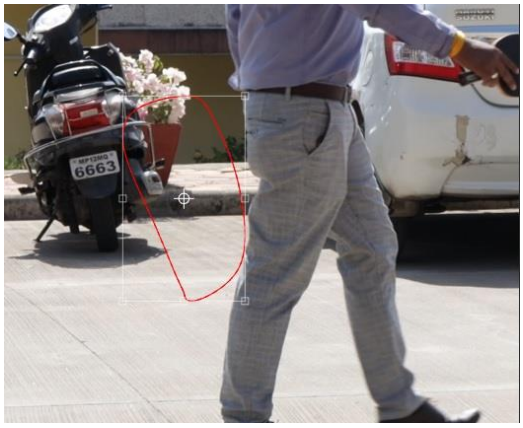


Fig. 3.7 Forward 10 frames Courtesy-Author

Step 4. Transform the shape, you will find that it is easy to rotate shape from joint because it is a pivotal point of leg. After rotation you need some adjustment, which you can do by reshape tool as shown in Figure 3.8.

Fig. 3.8 Transform the shape on different frames Courtesy-Author

This activity demonstrates the importance of human movement. Let us deal with different parts.

3.2 Isolating Extremities

During rotoscoping human figures, you need to isolate various limbs. So whenever isolating limbs like arms, legs, feet or hands. Consider two things always-

1. The way these objects are constructed
2. Where they rotate from.

If we focus on arms and legs, they only have two pivot points relative to their construction. Arms pivot from shoulder and elbow. Legs bend from hip and knee. It means, human figure will not alter too much except these two points. Therefore, if you rotate shape from these points then it can be easily modified with focus object.

Fig. 3.9 Hand movement through shoulder and elbow Courtesy-Author

Fig. 3.10 Leg movement through Knee Courtesy-Author

Practical Activity 3.2 – Create and animate shapes for leg movement.

For rotoscoping leg movement, create project in SilhouetteFX©v3.5 software. Import the footage on source window and create session. Then insert roto nodes between object and output.

Step 1. Search the frame to start creating shapes, as shown in Figure 3.11.

Fig. 3.11 Find the first frame to begin the roto Courtesy-Author

Step 2. Select the Bezier tool from toolbar and create the shape. Create two shapes one for leg and other for toe, as shown in Figure 3.12.

Fig. 3.12 Create the shape using Bezier tool Courtesy-Author

Step 3. Set the frame interval of 10 frames in Frame-steps and move the frame by pressing X key as shown in Figure 3.13.

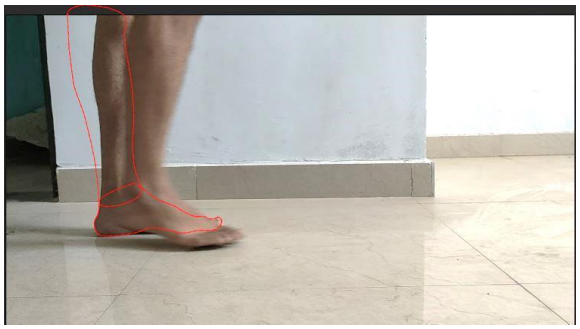


Fig. 3.13 Move the frame in given interval Courtesy-Author

Step 4. Select the transform tool and rotate the shape by pressing **W** as shown in Figure 3.14.

Fig. 3.14 Rotate the Shape Courtesy-Author

Step 5. Forward 10 frame again by pressing X key and observe the shape as shown in Figure 3.15.

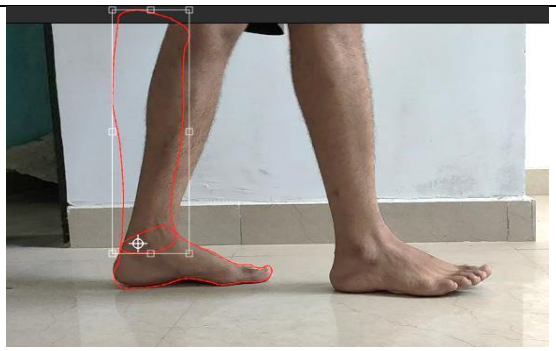


Fig. 3.15 Forward 10 frames Courtesy-Author

Step 6. Once again you need to rotate the shape. Remember that rotation happens from its anchor point. So when you press W key it create anchor point and enables rotation tool as shown in Figure 3.16.

Fig. 3.16 Rotate the shape Courtesy-Author

Step 3. After rotation, observe that it is not perfectly overlap on focus object. It needs some adjustment. Use reshape (R) tool and adjust the point as shown in Figure 3.17.

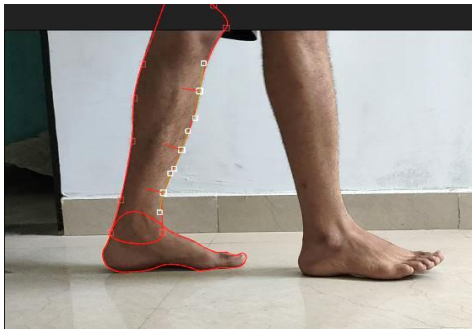


Fig. 3.17 Use Reshape tool to adjust the shape Courtesy-Author

Step 8. Again, Press X on keypad to move 10 frame and observe the object movement as shown in Figure 3.18.

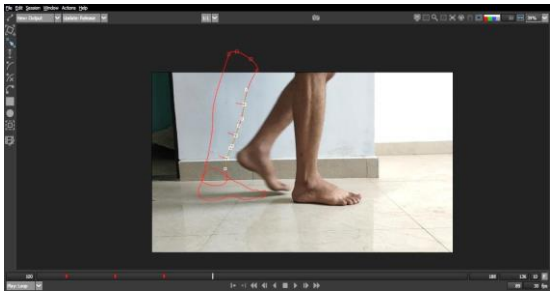


Fig. 3.18 Forward 10 Frame Courtesy-Author

Step 9. You have to use four things; Rotate (W), Move (Q), reshape and motion blur to animate the shape, as shown in Figure 3.19 (a) – (d).

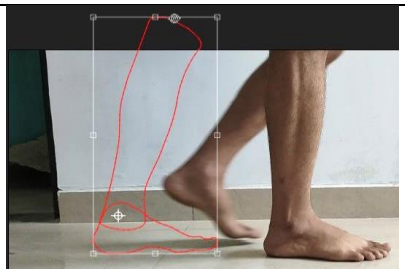


Fig. 3.19 (a) Rotate

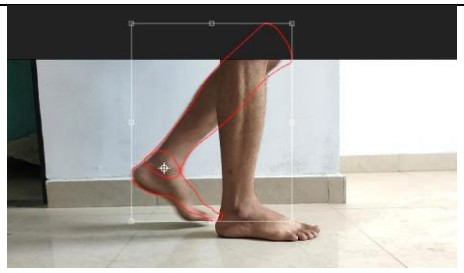


Fig. 3.19 (b) Move

Fig. 3.19 (c) Reshape

Fig. 3.19 (d) Edge Feather

Step 10. Again move 10 frame as shown in Figure 3.20, and observe the motion as shown in Figure 3.20.

Fig. 3.20 Forward 10 Frame Courtesy-Author

Step 11. Minimize motion blur on this frame, and modify as shown in Figure 3.21.

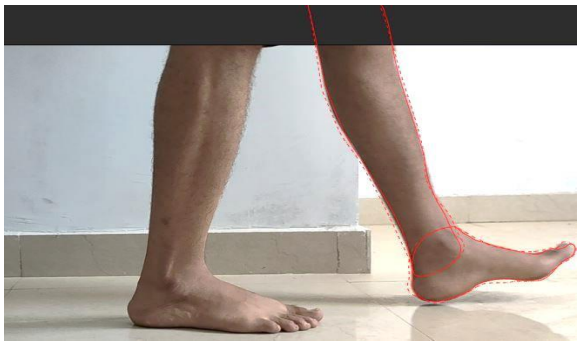


Fig. 3.21 Minimize Motion blur Courtesy-Author

Step 12. Now isolate 40 frames from 106 to 146 with using 10 frame intervals. Check frames between modified frames such as frame number 110, 120, 130, and 140 one by one as shown in Figure 3.22 (a) – (d).

Fig. 3.22 (a) Frame 110

Fig. 3.22 (b) Frame 120

Fig. 3.22 (c) Frame 130

Fig. 3.22 (d) Frame 140

Step 13. As you can see, all these frames need adjustment, so adjust the frame and check the random frame from 106 to 146 as shown in Figure 3.22. In this way, you can roto leg movement.

Assignment 2

Shoot the pushup video from DSLR or smartphone and isolate the person from video.

As you have seen in above practical activity, you got maximum movement of legs from two pivotal points like knee and ankle joint. Now we will discuss about hand movement.

3.3 Hands

A roto artist may have to isolate number of hands from the video shot. Suppose, you have to insert visual effects character in the video frame that holds the hand of a character or to put a weapon on the hand. To incorporate these effects, rotoscoping of hands is required.

Hand is slightly complex focus object to isolate, because it has fingers, palm, wrist and multiple pivot points. If you focus on finger, it can move in different direction. Legs and arms have only two pivot point. But in hand, each finger has three pivot points as shown in Figure 3.23 (a).

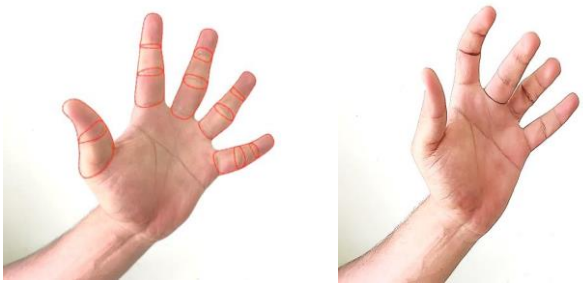


Fig. 3.23 (a) Finger and (b) its perspective change

It is possible to use single shapes for each finger but you have to aware about the movement of the fingers. There is also perspective issue in hand movement. When the finger curls forward while facing camera then it's movement is straight forward. Observe the change in perspective of the finger in Figure 3.23 (b). However, hands are really easy

to breakdown into shapes. They always pivot from the same point. During the hand's isolation, knowledge of hand movement plays a key role for correctly breaking it.

The palm is a slightly different. Palm movement is complex and you need to use your instinct to break it in a shape. To start with to split up the palm is to create separate shapes for (i) The palm itself (ii) The meaty bit connected to the thumb as shown in Figure 3.24.

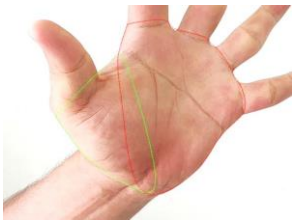


Fig. 3.24 Shape breakdown of Palm Courtesy-Author

During breakdown of the palm you need to focus on control point placement. Try to keep a point on the base of every finger when you are making palm shape. It will help as a marker which can make the shape consistent as shown in Figure 3.25.

Fig. 3.25 Control point on the base of Finger Courtesy-Author

The points which are added in the base of the fingers keeps their relative position, with respect to their relevant fingers, while hand is moving. If you create shapes correctly and with foresight, you can use that shape's points as reference to keep your shapes correctly isolating the same edges of the focus object and avoid manipulating that shape in a sub-object level. These reference points are very helpful during isolating hands because it provides an easy visual reference.

Practical Activity 3.3 – Demonstrate to Isolate the palm from video footage.

Step 1. Breakdown the picture of hand in two different shapes and take 10 frame intervals to animate the shape as shown in Figure 3.26. Press **X** key to move the 10 frame forward. After forwarding the frame by 10 frames the hand picture will look like as shown in Figure 3.27.

Fig. 3.26 Frame Steps Courtesy-Author

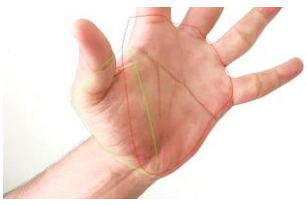


Fig. 3.27 Hand picture after forwarding by 10 frame Courtesy-Author

Step 2. Select Transform tool by pressing T key and adjust the shape. The hand picture will look like as shown in Figure 3.28. If needed, use reshape tool also.

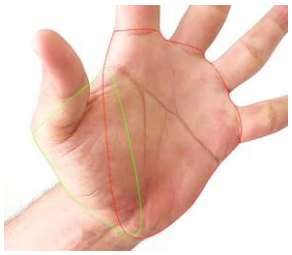


Fig. 3.28 Hand picture after using transform tool Courtesy-Author

Step 4. Press X key to forward 10 frames again. The picture of hand after forwarding 10 frames is shown in Figure 3.29 (a). Now adjust it by using Transform and Reshape tool as shown in Figure Figure 3.29 (b). For this use the Transform tool to adjust the position then use Reshape tool to control points.

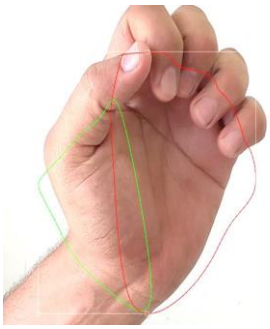


Fig. 3.29 (a) Forward 10 frame

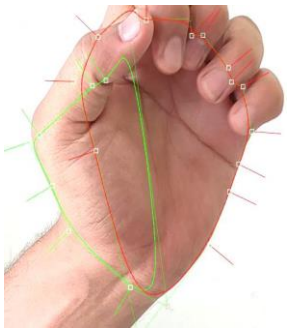


Fig. 3.29 (b) Adjust the shape using transform and reshape

Step 5. Press A to observe the shape in overlay mode.

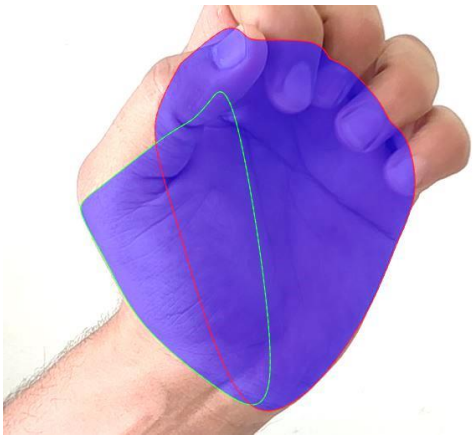


Fig. 3.30 Overlay Mode Courtesy-Author

Step 6. Again press X to move 10 frames forward as shown in Figure 3.31 (a) and modify it as shown in Figure 3.31 (b).

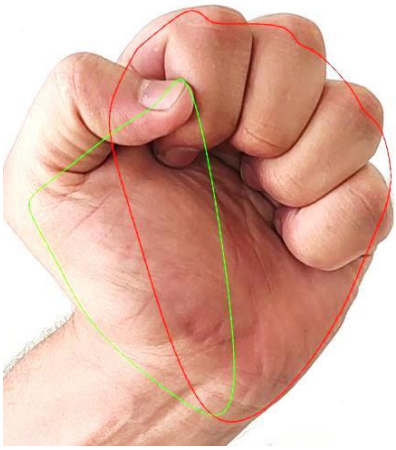


Fig. 3.31 (a) Forward the shape

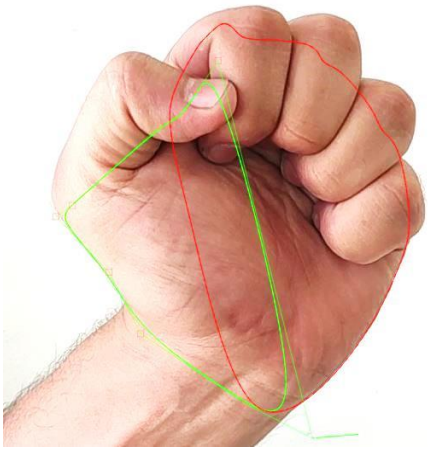


Fig. 3.31 (b) Modify the shape

Step 3. Thus you the frame can be modified in interval. The modified 40th and 50th frame are shown in Figure 3.32 (a) & (b).

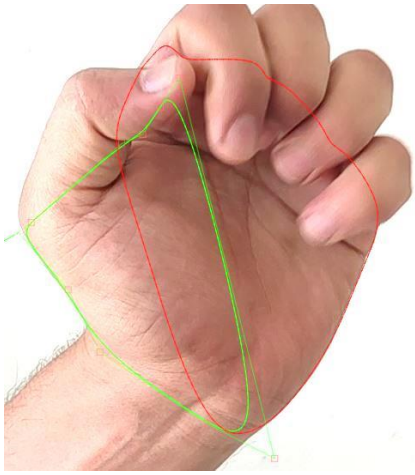


Fig. 3.32 (a) Frame 40th

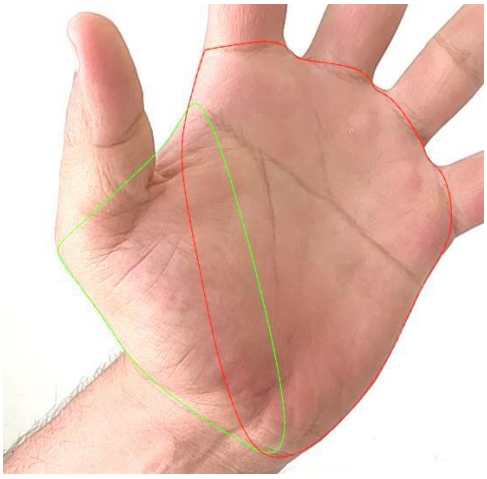
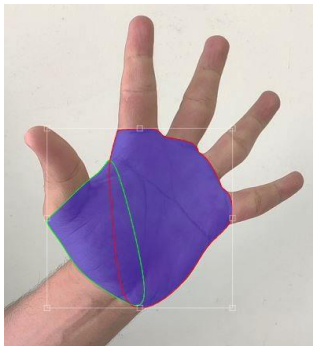
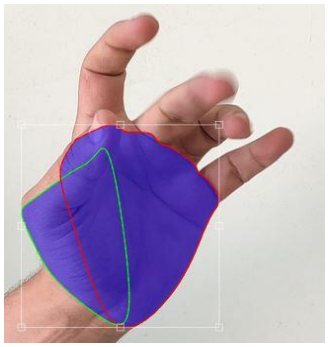


Fig. 3.32 (b) Frame 50th Courtesy-Author

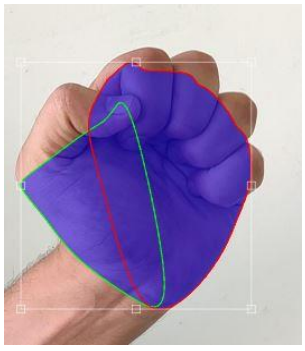
Step 8. Playback the footage and observe its shape in proper interval of frames as shown in Figure 3.33. Check in between frames again and adjust it.



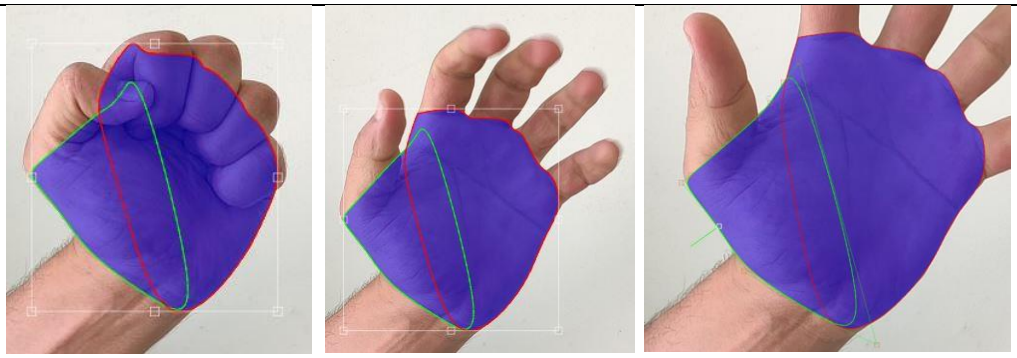
Frame 5



Frame 15



Frame 25



Frame 35 Frame 45 Frame 55

Fig. 3.33 Shape of different frames Courtesy-Author

Observe the Figure 3.33 that the shape of palm has been modified according to the focus object. Next create shape for fingers. In the next Practical Activity 3.4, we see how to animate multiple shapes of fingers. You must be aware about the complexity of finger movement. So try to animate a single finger at once. You also need to arrange shapes in object list which helps to identify the shapes.

Practical activity 3.4 – Demonstrate to isolate the fingers from video footage.

In the previous Practical activity 3.3, it is demonstrated to isolate the palm. Now let us continue on the same footage and isolate the finger in the following steps.

Step 1. Navigate the first frame and create shapes for fingers using X spline or any other spline as shown in Figure 3.34.

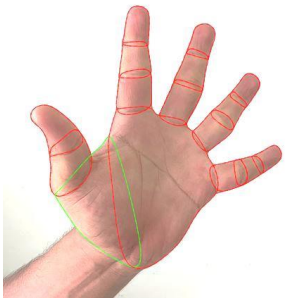


Fig. 3.34 Create multiple shapes Courtesy-Author

Step 2. Now observe the object list as shown in Figure 3.35 to manage the multiple shapes. Now we will work on index finger so disable all shapes except the finger as shown in Figure 3.36.

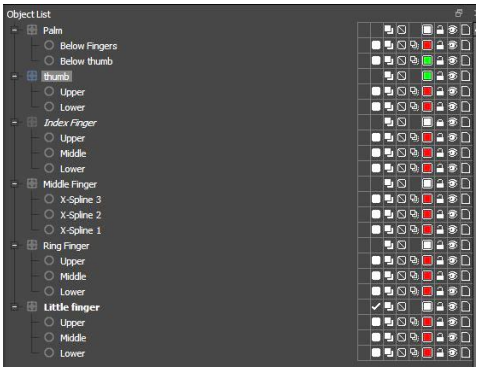


Fig. 3.35 Object List Courtesy-Author

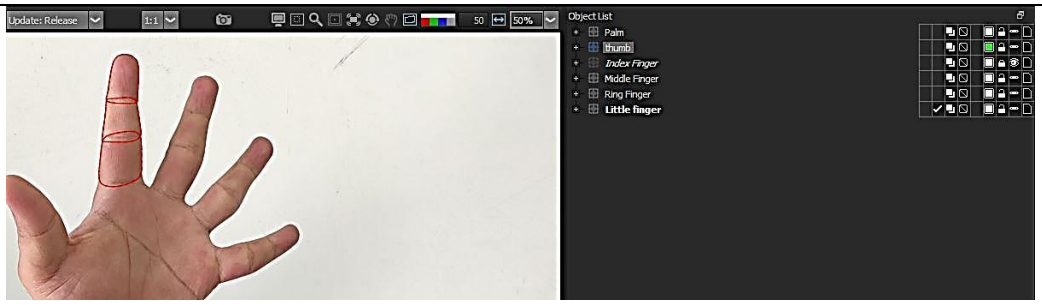


Fig. 3.36 Disable all shapes except index finger Courtesy-Author

Step 3. Next, set 5 frame intervals as shown in Figure 3.37.

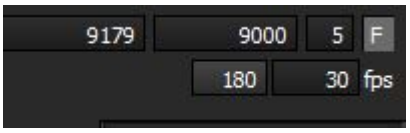


Fig. 3.37 Set Frame-steps Courtesy-Author

Step 4. Press **X** key to move the 5 frames further and modify the frame. Observe the 5th frame and 10th frame as shown in Figure 3.38 (a) & (b).

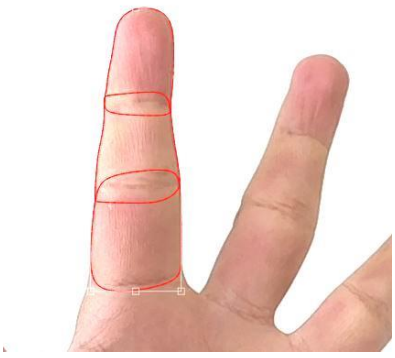


Fig. 3.38 (a) 5th Frame

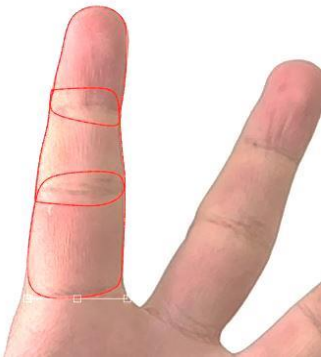


Fig. 3.38 (b) 10th Frame

Step 5. Observe the Figure 3.39 (a) by moving to 15th frame the finger starts bending. Now you have to move the shapes from its pivot point by using transform tool. After this you need to adjust the shape by reshape tool.

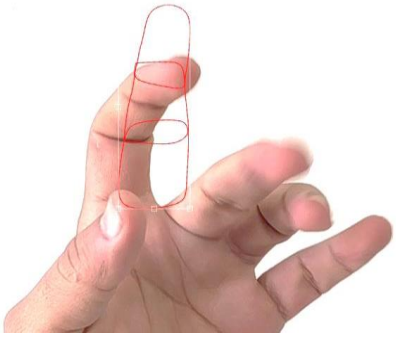


Fig. 3.39 (a) 15th Frame

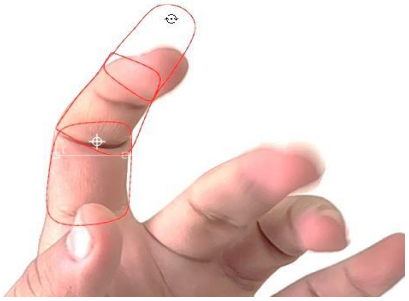


Fig. 3.39 (b) Move the shape and rotate the middle Point using rotate (W) tool

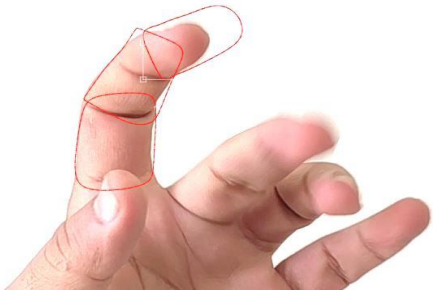


Fig. 3.39 (c) Rotate upper pivot point

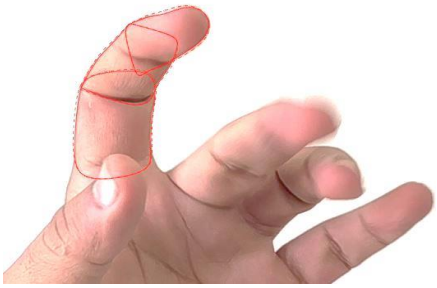


Fig. 3.39 (b) Move the shape and rotate the middle Point using rotate (W) tool

Step 6. Now observe the 20th frame in Figure 3.40 (a). It is required to modify it using Transform and Reshape tool as shown in Figure 3.40 (b), (c), (d).

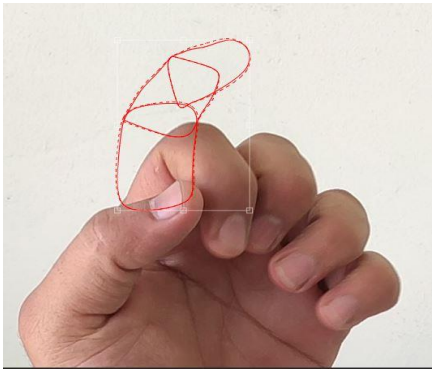


Fig. 3.40 (a) 20th frame

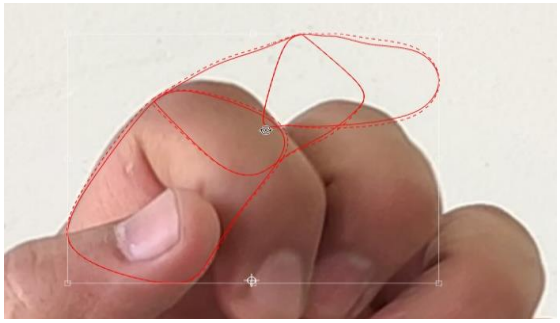


Fig. 3.40 (b) Adjust the position and rotate the shape from its pivot point

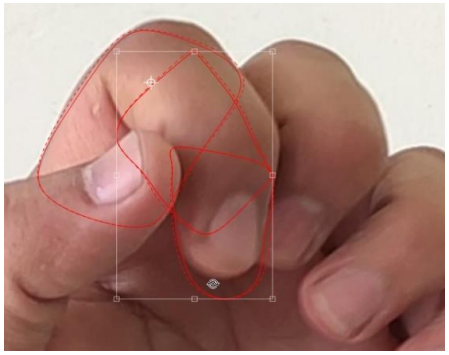


Fig. 3.40 (c) Rotate middle and upper shape by pivot point

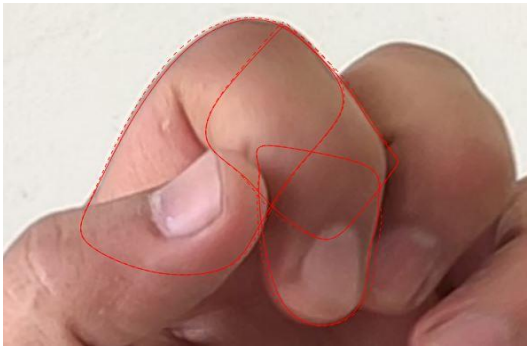


Fig. 3.40 (d) Transform and adjust all shape by using transform and reshape

Step 3. Now move to frame 20th, 25th, 30th, 35th and 40th. Observe these frames in Figure 3.41 (a) to (e) that have little change. Modify it according to focus object. Keep focus on the object which connects with outer edge.

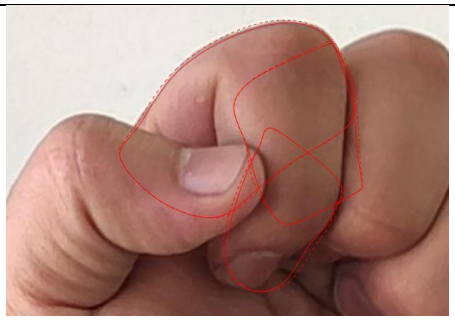


Fig. 3.41 (a) 20th Frame

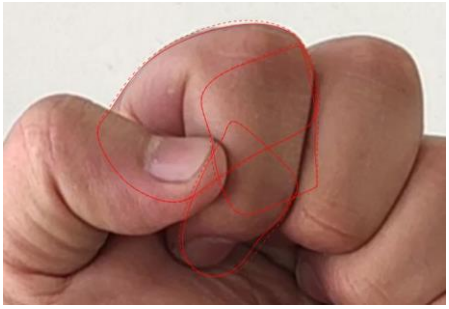


Fig. 3.41 (b) 25th frame

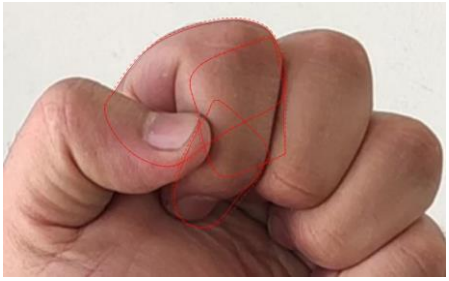


Fig. 3.41 (c) 30th frame

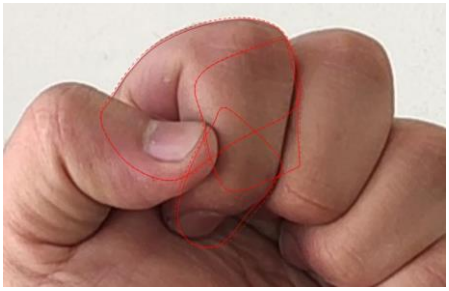


Fig. 3.41 (d) 35th frame

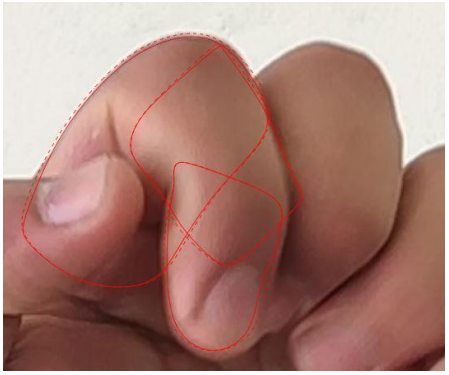


Fig. 3.41 (e) 40th frame

Step 8. Now move to 45th frame by pressing X key on keyboard. Observe the frame in Figure 3.42 (a). Use pivot point to move, transform and readjust as shown in Figure 3.42 (b), (c), (d). Adjust motion blur by feather handle.

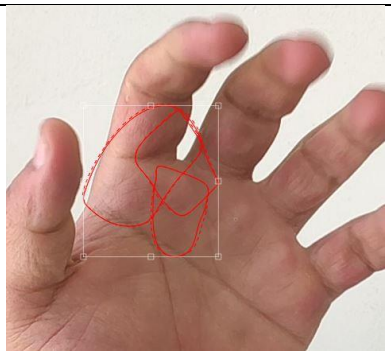


Fig. 3.42 (a) 45th Frame

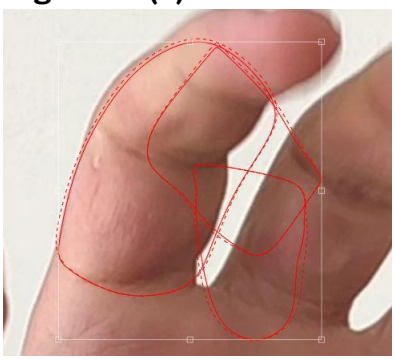


Fig. 3.42 (b) Adjust lower shape by rotate and move too

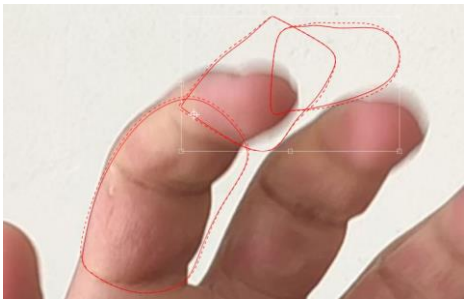


Fig. 3.43 (c) Select middle and upper shape

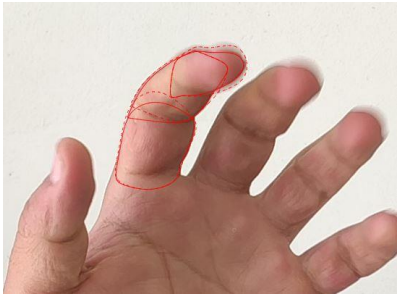


Fig. 3.43 (d) Final shape Rotate it

Step 9. Further modify the 50th frame like first frame as shown in Figure 3.44.

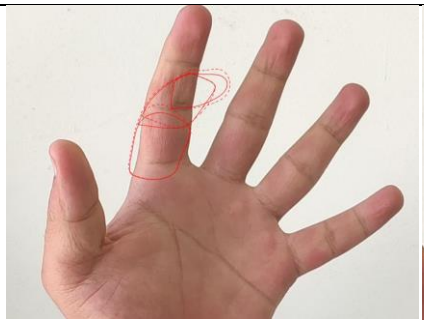


Fig. 3.44 (a) 50th Frame

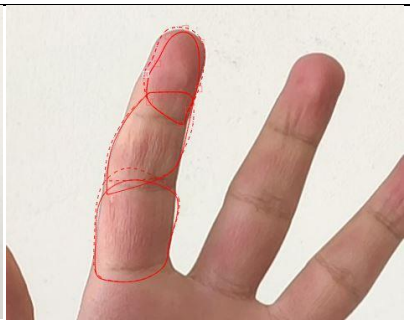


Fig. 3.44 (b) Rotate the lower shape

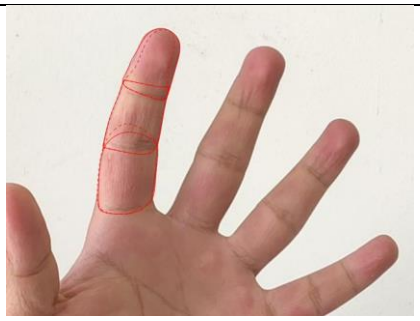


Fig. 3.44 (c) Final Frame

It is possible to isolate all fingers by using the steps given in Practical Activity 3.4.

3.4 Joints

It is observed that when creating a shape for extremities, there is a definite pattern. Most of the shape in extremities begin and end their movement around their pivot point as shown in Figure 3.45.

Fig. 3.45 Joints Courtesy-Author

These joints are not doing the same movement as legs and arms, because it can bend, distort and rotate. It also squeezes and expands according to the movement. Let's take a look at the gentleman taking push-ups in Figure 3.46. His upper arm and forearm shapes established already, but the joints between them need to be isolated as well.

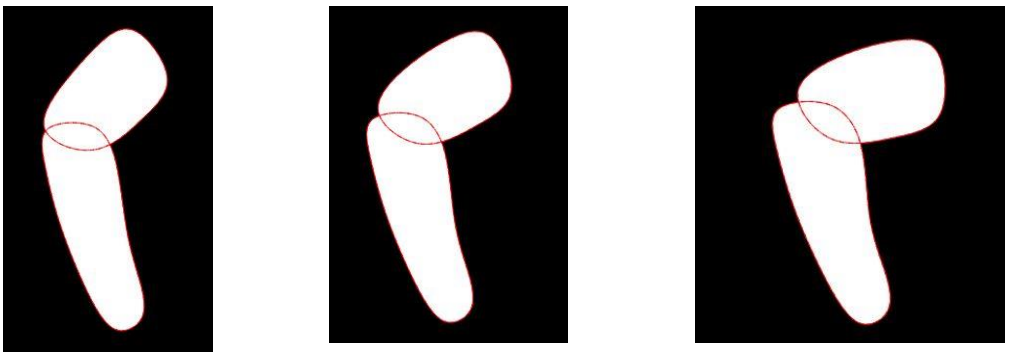


Fig. 3.46 Bicep's Movement and their joint Courtesy-Author

You can create a single shape for joints. But in that situation, you need to create lot of point and it will become complicated with their movement. So it is better to create small multiple shapes for joints which can move easily. We will create two shapes on the elbow joint and move it in 5 frame interval as shown in Figure 3.43. Let's check the result.

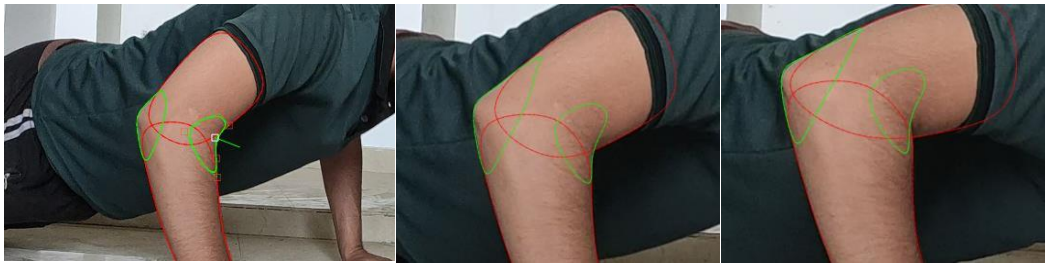


Fig. 3.47 Two shapes created in Bicap's joint (Green outline) Courtesy-Author

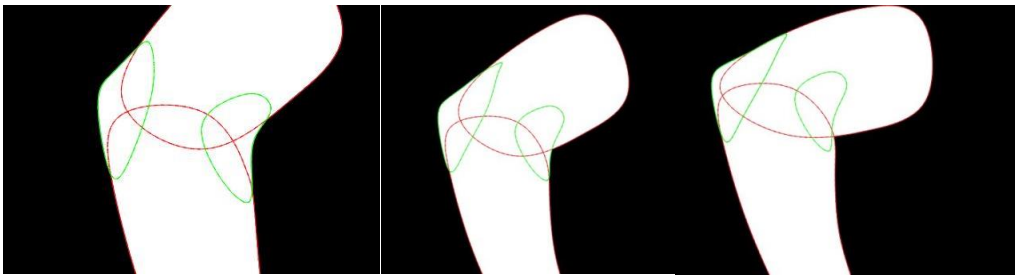


Fig. 3.48 Matte view of bicep's with multiple spline on joint Courtesy-Author

It is clear from the Figure 3.47 and 3.48 that creating multiple shapes is the best option for joint movement. We have created only two points for bicep's joint. For more, create additional shapes for smooth movement during isolating the focus object.

3.5 Overlap the shapes

We are breaking an object into multiple shapes. When we are creating these shapes, you must remember that these shapes jointly represent an object and it should create smooth edges as shown in Figure 3.49.

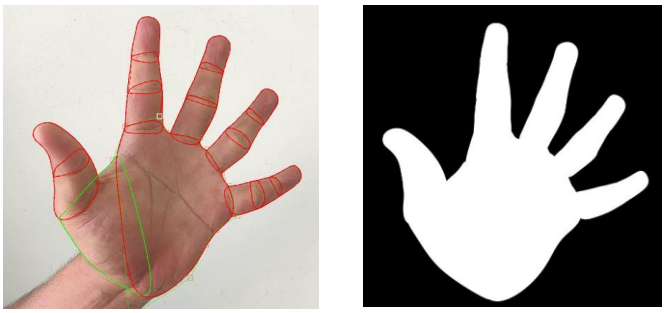


Fig. 3.49 Smooth edge created in Palm isolation Courtesy-Author

Now disable all shapes in Figure 3.49 and create multiple splines for middle finger.

a. Let's create it without overlapping the shapes.

Fig. 3.50 (a) Finger splines

Fig. 3.50 (b) Colour overlay

Fig. 3.50 (c) alpha view

Observe that the shapes are not overlap then it will not look as a complete shape and its edges are not smooth.

b. Now overlap the multiple shapes. After overlapping the splines, the final shapes don't have any hard edges. Observe the alpha view in Figure 3.51, the shape has smooth edge.

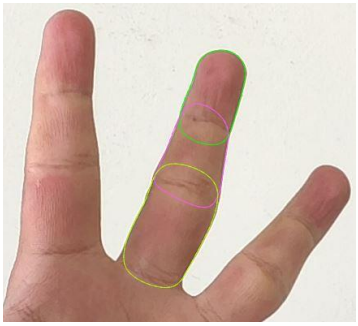


Fig. 3.51 (a) Finger splines

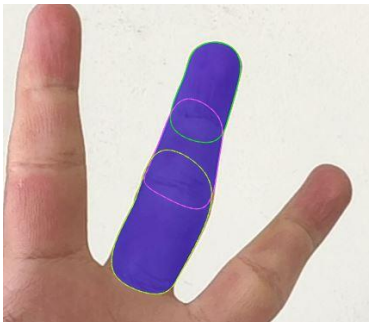


Fig. 3.51 (b) Colour overlay

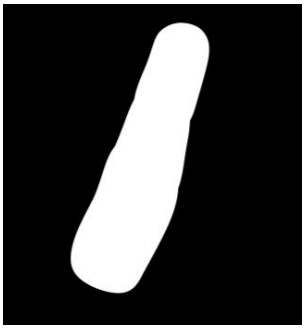


Fig. 3.51 (c) alpha view

3.6 Inverse Kinematics (IK)

As you may be aware that human movement is natural and is performed by the joints. So understanding these natural movements enable you to perform human roto easily.

Inverse kinematics (IK) helps to capture these natural movements. 'Inverse' means reverse and 'Kinematics' means motion. So Inverse Kinematics (IK) means motion, which already happened. For example, the person showing in the Figure 3.52 has completed his movements. You have to recapture and recalculate his motion. This is called as Inverse kinematics. It is demonstrated in Practical Activity 3.5.

Fig. 3.52 Person is moving Courtesy-Author

More to know – In inverse Kinematics, you need not to perform rotoscoping. You have to recapture natural movement of human figure and then adjust shapes manually.

Practical Activity 3.5 – Recapture the movement of the person's right leg by Inverse Kinematics (IK).

Step 1. First import the image sequence in Silhouette software. Create a session in **trees window** and insert roto nodes as shown in Figure 3.53.

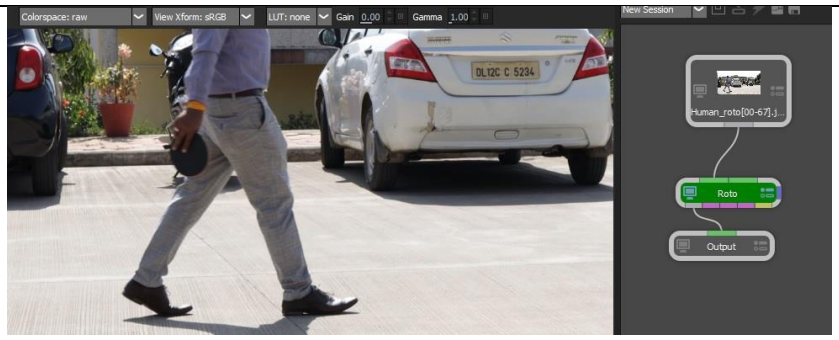


Fig. 3.53 Create a session in trees window Courtesy-Author

Step 2. Breakdown the left leg in shapes as shown in Figure 3.54 using X-Spline.

(a) Thigh (b) Knee (c) Shin (d) Ankle (e) Foot

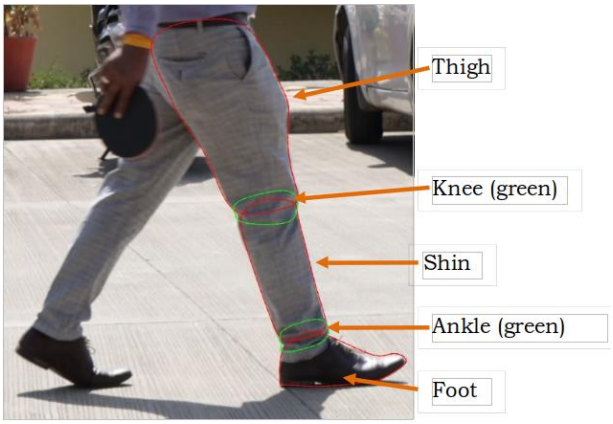


Fig. 3.54 Breakdown of object in different shape

Step 3. Rename the shape in object list as shown in Figure 3.55.

Fig. 3.55 Object list Courtesy-Author

Step 4. Now organize the shape in different layers. Imagine the joint which is important during movement. Create layers for every joint like thigh, knee, ankle, foot. These are the steps.

a. Create a layer for Right leg (Figure 3.56) and insert all the shapes on it.

Fig. 3.56 Insert all shapes in Right Leg layer Courtesy-Author

b. Now create a new layer and rename it as Knee (Figure 3.57). Insert knee and shin shape on it. Drag and drop this Knee layer under right leg layer.

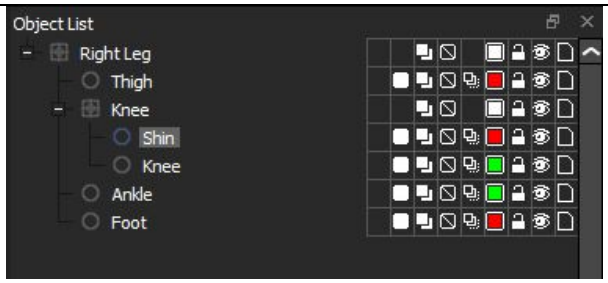


Fig. 3.57 Insert Shin and Knee in Knee layer Courtesy-Author

c. Now create ankle layer and insert ankle shape on it as shown in Figure 3.58.

Fig. 3.58 Ankle Layer is created Courtesy-Author

d. Now place ankle layer under knee layer.

Fig. 3.59 Ankle Layer place under knee layer Courtesy-Author

e. Now create foot layer under ankle layer and insert the foot shape as shown in Figure 3.60.

Fig. 3.60 Foot layer place under Ankle layer Courtesy-Author

Step 5. Now select layer and enable the rotate option in object window as shown in Figure 3.61(b).

Fig. 3.61 (a) Right Leg Layer is selected Courtesy-Author

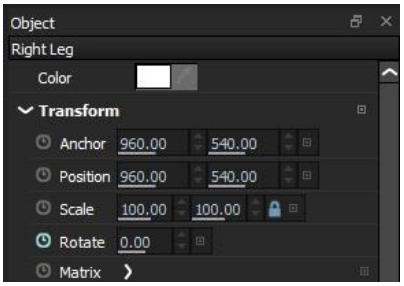


Fig. 3.61 (b) Enable rotate option in object window Courtesy-Author

Step 6. Enable rotate option for remaining layer as shown in Figure 3.62.

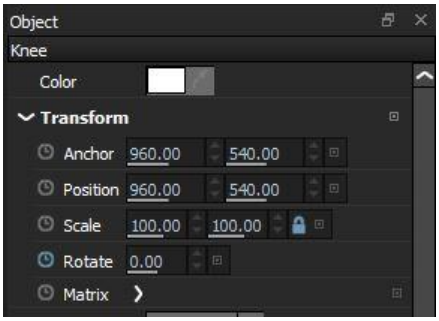


Fig. 3.62 Enable rotate option Courtesy-Author

Step 3. Adjust the joint position of each layer. For this perform following steps.

a. Select right leg layer and choose transform tool. An anchor point displays on viewer as shown in Figure 3.63.

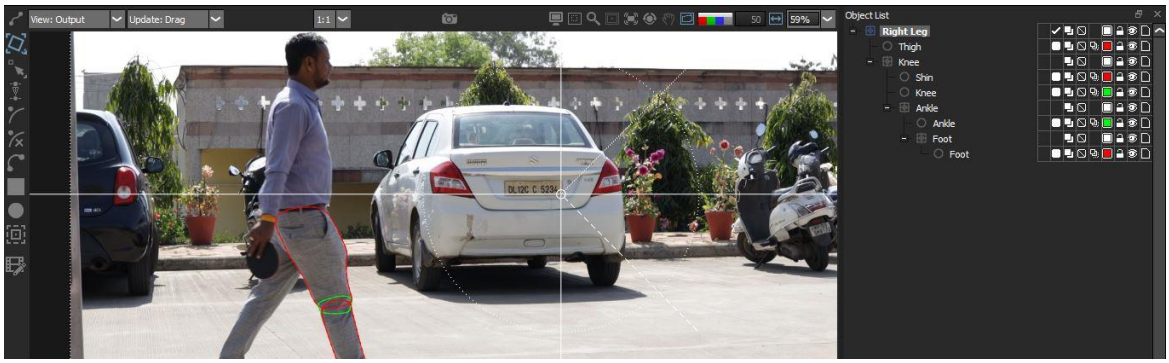


Fig. 3.63 Anchor/Joint Position Courtesy-Author

b. Place anchor point on upper thigh as shown in Figure 3.64. This is the first point of IK.

Fig. 3.64 First Joint Position Courtesy-Author

Step 8. Now select remaining layers one by one and place their anchor point on joint as shown in Figure 3.65.

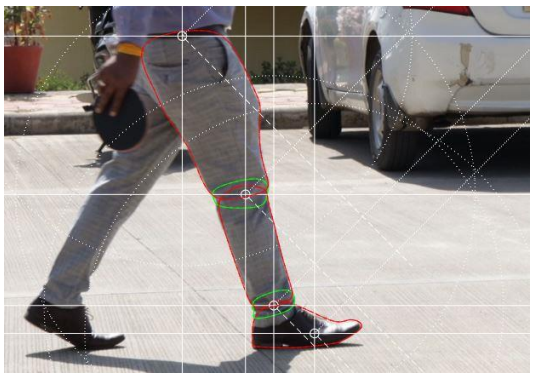


Fig. 3.65 Anchor point is placed on joint Courtesy-Author

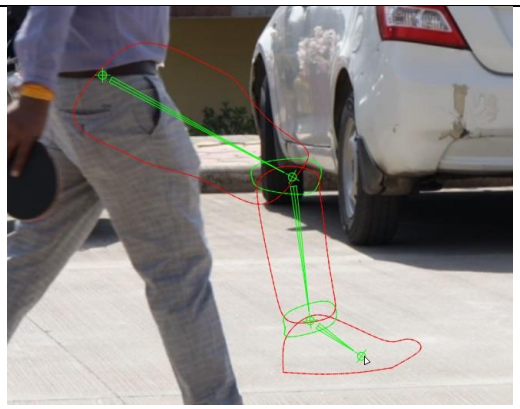
Step 9. Now select IK tool on tool panel as shown in Figure 3.66.

Fig. 3.66 IK Tool

Step 10. Click on IK tool, the anchor point converts in joints. Make sure to select all the layers while you turn on IK tool. Observe the magic after clicking on IK as shown in Figure 3.67.

Fig. 3.67 Joints are connected Courtesy-Author

Step 11. If you click on anchor point then all the above shape from this joint will be selected. You can rotate all selected shape from their joints. However, if you click between anchor point then only the selected shape will rotate as shown in Figure 3.68.



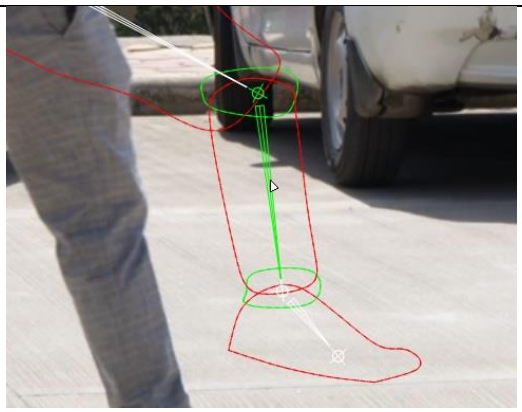


Fig. 3.68 (a) Rotate all shapes from joint **Fig. 3.68 (b) Rotate selected shape**

Step 12. Bring all the shapes in original position.

Step 13. Observe that shape is not moving, when you forward the video as shown in Figure 3.69.

Fig. 3.69 Shape is not moving with object Courtesy-Author

Step 14. So use tracker to transform the shape. Move to first frame and select tracker. Follow the following steps of tracking.

a. Select point tracker as shown in Figure 3.70 (a) & (b) and click on Create option. A tracker will be appeared on object list. Place it over the Right leg layer. You can select the tracking point on viewer as shown in Figure 3.71.

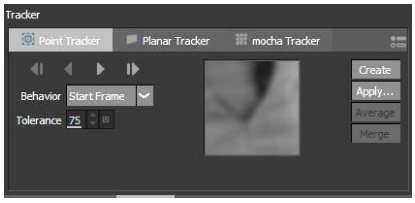


Fig. 3.70 (a) Point tracker is created Courtesy-Author

Fig. 3.70 (b) Place the tracker over the right leg layer Courtesy-Author

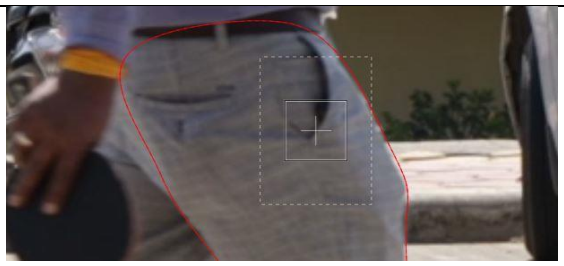


Fig. 3.71 Tracking Point Courtesy-Author

b. Now click on "Track Forward" or "Track Forward one frame" button to track the motion of object as shown in Figure 3.72.

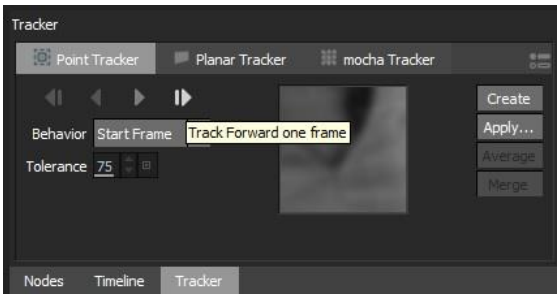


Fig. 3.72 Track forward button Courtesy-Author

c. Observe the tracking progress in viewer as shown in Figure 3.73. If you find any difficulties in tracking, stop it and correct the track manually using anchor point.

Fig. 3.73 Point tracking is completed Courtesy-Author

d. Now as you see, shape is still placed on first frame. So apply tracker on the layer after tracking.

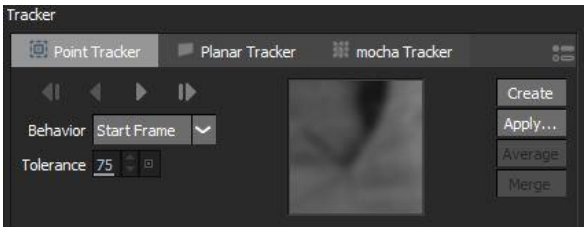


Fig. 3.74 Point tracking is completed Courtesy-Author

e. Observe the tracking on 5 frame intervals as shown in Figure 3.75 (a), (b), (c), (d), that the shapes are moving with object.

Fig. 3.75 (a) First Frame

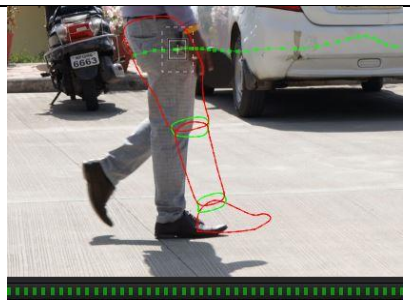


Fig. 3.75 (b) Fifth Frame

Fig. 3.75 (c) Tenth Frame

Fig. 3.75 (d) last Frame

Step 15. Now move to the first frame as shown in Figure 3.76.

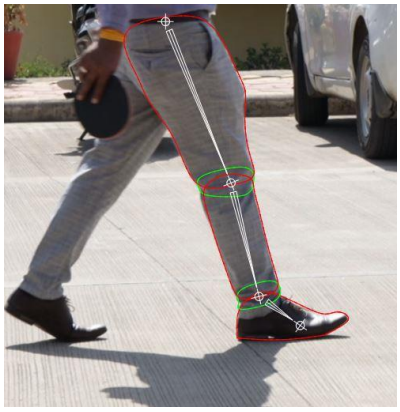


Fig. 3.76 First frame with IK Courtesy-Author

Step 16. Move to Fifth frame and adjust the movement by IK tool as shown in Figure 3.77 (a) & (b).

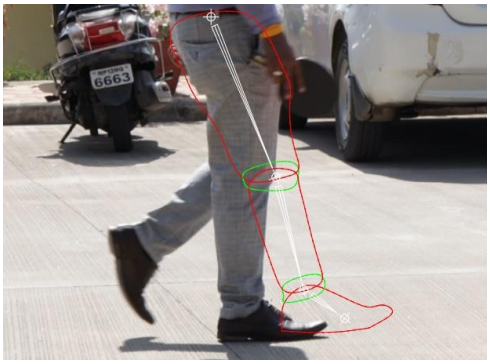


Fig. 3.77 (a) First frame (before)

Fig. 3.77 (b) First frame (after)

Step 13. We will move a random frame say, 20th frame and adjust the movement by IK tool as shown in Figure 3.78 (a) & (b).

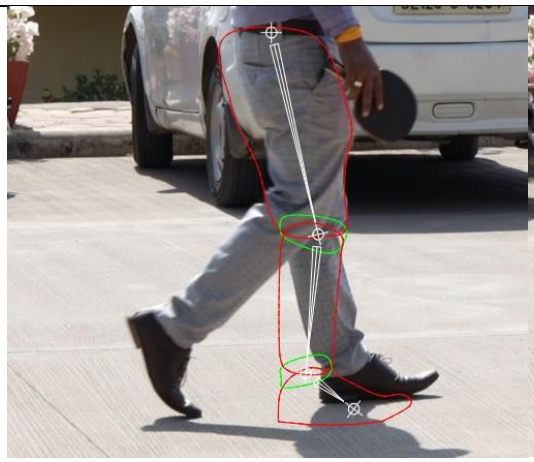


Fig. 3.78 (a) 20th frame (before)

Fig. 3.78 (b) 20th frame (after)

Step 18. Thus, it can be seen that inverse kinematics (IK) is useful to capture natural movement. As IK is not performing rotoscoping, it captures movement which can be finished later by using reshape and transform tool.

Assignment 3

Download horse running video and isolate the horse leg using IK tool.

Summary

- In human figure rotoscoping, it is necessary to know the movement of human hands, fingers and feet.
- During isolating extremities, consider the way objects are constructed and where they rotate from.
- To work faster, use shortcut keys to Rotate, Move, Reshape and Motion blur.
- Consider perspective issues during the roto of hand and finger movement.
- While the hand is moving, the points placed to the base of the fingers maintain their relative location to their respective fingers.
- Organize the shapes into object list so that you can easily locate the shape.
- Overlap multiple shapes during human rotoscoping, so that it represents the object rather than the shapes.
- Inverse Kinematics is useful to capture natural movement.

CHECK YOUR PROGRESS

A. Multiple Choice Questions

1. In Human figure rotoscoping, which movement is not necessary to know (a) Hands (b) Fingers (c) Legs (d) Eyes
2. Remember the following things while perform human rotoscoping (a) Take a single shape at a time (b) Roto some frames of each shapes (c) Move to another shape without finish first shape (d) Take any random shape and start roto
3. Arms and legs have____ Pivot points (a) One (b) Two (c) Three (d) Four
4. In hands, each finger has___ Pivot points (a) Two (b)Three (c)Four (d)Five
5. There is____ issue in hand movement (a) Joint (b) Focus (c) Perspective (d) Anatomy

6. During breakdown of palm, keep a point on the_____ of every finger (a) Corner (b) Top (c) Joint (d) Base
7. Create_____ are the best option for joint movement (a) Single shape (b) Two shape (c) Multiple shapes (d) Open shape
8. While breakdown an object in multiple shapes, _____ these shapes (a) Separate (b) Overlap (c) Join (d) Intersect
9. Inverse kinematics means motion, which is____ (a) Already happened (b) Going to happen (c) Backward (d) Forward

B. Fill in the blanks

1. Differentiate shape based on their _____.
2. You can choose any shape for roto but never leave it in_____.
3. It's easy to rotate shapes from_____ because it is a pivot point.
4. Arms pivot from _____ and elbow.
5. During breakdown of the palm, you need to focus on _____ placement.
6. You also need to arrange shapes in____ which helps you to identify the shape.
7. Most of the shape in extremities begin and end their movement around their ____.
8. In IK, we perform recapture and _____ the motion.

C. True or False

1. During rotoscoping human figures, you need to isolate various limbs.
2. Legs bend from hip and ankle.
3. Hands have single pivot points.
4. You can create single shapes for joints which can move easily.
5. In Inverse Kinematics, you will not perform rotoscoping.
6. During IK, Anchor point is placed in joint.

D. Short answer questions

1. Write the connection between human anatomy and human roto?
2. What is the important point to remember while performing human roto?
3. How can you isolate the extremities?
4. What is the need of Hand roto? Explain it with suitable example.
5. How to isolate hand and palm?
6. In how many shapes, you should breakdown fingers during roto?
7. Write the rotoscoping technique of isolating joints.
8. Why we need to overlap the shape during human roto?
9. What is Inverse Kinematics?
10. How can you organize the shape in different layers while performing IK?
11. Make a list of objects which can be isolated by using Inverse Kinematics.

Session 4. Rotoscopy of Hair

Till now, we have seen the rotoscoping of organic and inorganic objects. Now let us see rotoscoping of objects as mattes and how these objects are isolated from its background.

Fig. 4.1 A person is imagine surrounding in a matte

The rotoscoping of human shape includes human body parts such as hands, legs and fingers. Finger rotoscoping is slightly difficult due to lot of pivot movement during finger roto. In hair rotoscoping, you have to consider face either individual hair or strands of hair which are free to move.

Hair is a small and blurry, even slightly head rotation can change everything about hair's edge. Hair is like thousands of tiny, boneless limbs that have no uniform movement and it is affected by the little breezes.

Fig. 4.2 (a) Different hair style Courtesy-Freepik.com

Fig. 4.2 (b) Curly hair Courtesy-medium.com

Observe in Figure 4.2 (a) that numerous hair styles make hair rotoscoping complicated. The most irritating is the curly hairs shown in Figure 4.2 (b). It needs special attention to each individual hair which is tiny, like invisible. The hairs set by gel are good enough, but you will not get it always. To start with the hair rotoscoping, divide hairs in two shapes - (i) Basic Shape (ii) Standouts

4.1 Basic Shapes

It is a section of hair which appears in whole and it has definable edge that can be isolated with shapes. It will not change their contour to great extent. So first step is to identify these hairs and isolate it. Observe the Figure 4.3. Here you need to create basic shapes for those hairs which have fix shapes.

Fig. 4.3 Picture to perform hair rotoscoping Courtesy-Author

Practical Activity 4.1 – Create basic shape of hairs to the given footage.

Before creating basic shapes of hairs, you need to create project in Silhouette FX© software, then import the given footage. Create session and insert roto nodes between the footage and output. Then follow the following steps.

Step 1. Play-back the footage and select the video frame which has complete shape and sharpness as shown in Figure 4.4.

Ist frame **109th frame** **210th frame**

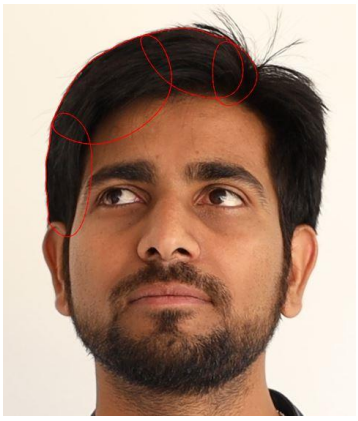
Fig. 4.4 Frames with complete shape and sharpness

Now observe all the three frames in Figure 4.4 and select the best frame to start the rotoscopy. Generally we start with the first frame but here it seems to be 109th is a perfect frame for rotoscoping. It also describes the hair style which suites best to start roto from this frame.

Step 2. Once you select the frame, you need to select spline for roto. You can choose anyone from X spline, B spline and Bezier. This time we will select X-spline from Roto tool panel.

Step 3. Now you need to create basic shape by X-spline. Press Plus (+) button to zoom in the footage, and use Spacebar to navigate within footage.

Step 4. Use X-spline tool and draw the shape of left side head as shown in Figure 4.5. Ensure the overlapping of the shape properly so that it creates perfect edge.



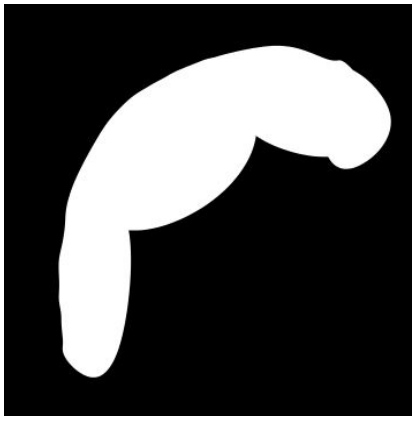


Fig. 4.5 (a) Shape of left side head **Fig. 4.5 (b) Alpha view Courtesy-Author**

Step 5. You need to make a layer on object list to put all these splines together. It will help you to identify the splines later.

Fig. 4.6 Manage different shapes Courtesy-Author

Step 6. Now you need to create shapes for right side of hair as shown in Figure 4.7 (a). Again select X-spline by pressing **S** on keyboard and create the shapes. Don't forget to create object list as shown in Figure 4.7 (b).

Fig. 4.7 (a) Right side Shape

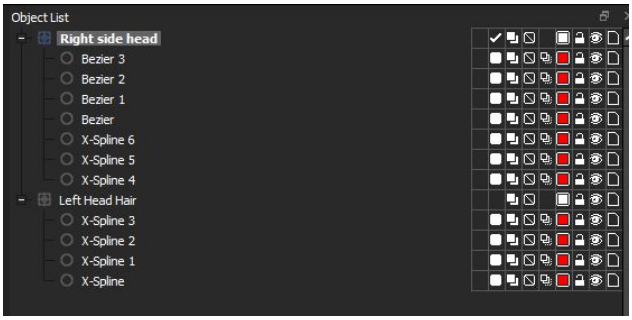


Fig. 4.7 (b) Object list Courtesy-Author

Step 7. After creating these shapes, check the edge feather as shown in Figure 4.8 (a). Always confirm from compositor that they need edge feather on the matte or not.

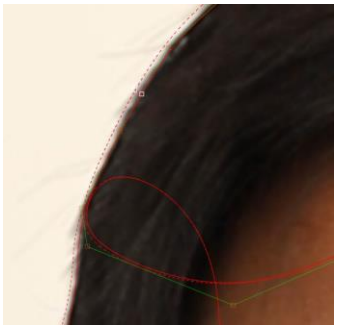


Fig. 4.8 (a) Edge Feather

Fig. 4.8 (b) Alpha Matte Courtesy-Author

Step 4. To complete the basic shapes, create shapes for face also, although it is not necessary while working with hair rotoscoping. We will divide face in two parts and create separate shapes for ears as shown in Figure 4.9.

Fig. 4.9 Breakdown of object in different shapes Courtesy-Author

Step 9. Observe that the face splines colour is green. You can change spline colour on object list as shown in Figure 4.10.

Fig. 4.10 (a) select the spline outline colour

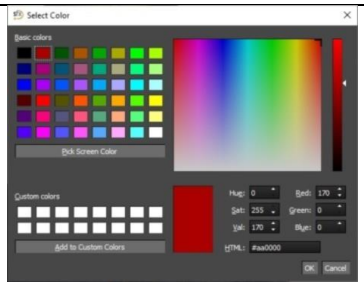


Fig. 4.10 (b) Change spline colour

Step 10. Let us check the alpha matte and solid view of video frame.

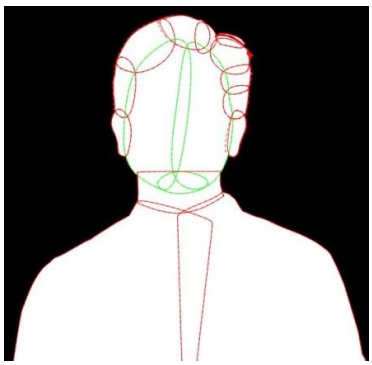


Fig. 4.11 (a) Alpha matte

Fig. 4.11 (b) Solid Comp View

After completing the basic shapes, let us now move towards standout shapes.

4.2 Standout Shapes

If you observe the top of the head you will find stragglers that are not easily covered by basic shape. After creating solid edge for focus object, next step is to identify the strands of hair that is not included in basic shapes. Now the problem is, how to identify these strands as they are large in numbers.

To identify these strands, don't magnify the frame and press **F** in keyboard to see its whole view. Then identify the strands as shown in Figure 4.12 (a) After this, magnify the strand as shown in Figure 4.12 (b) and observe the technique that you can apply on it.

Fig. 4.12 (a) Visible hair Strands

Fig. 4.12 (b) Magnify hair strand

Isolating the individual hairs is complex task. So we will use open poly which is specially used for hair roto.

Open Shapes/ Open Poly

In open poly, create shapes using splines. Here you do not need to close it by connecting with first point. Let us create it using the following steps.

Step 1. Select X-spline and create control points as shown in Figure 4.13. Press "Esc" key to close the shapes.

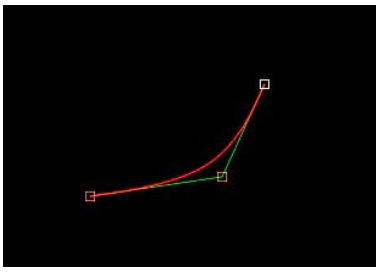


Fig. 4.13 (a) Create control points

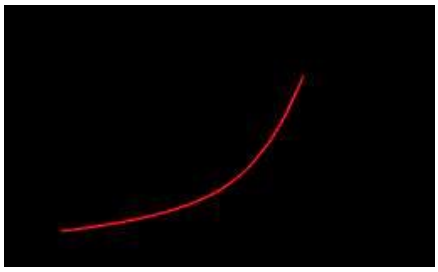


Fig. 4.13 (b) Press Esc to close the shape

Step 2. Again select the shape using Reshape and view its properties on Object window as shown in Figure 4.14.

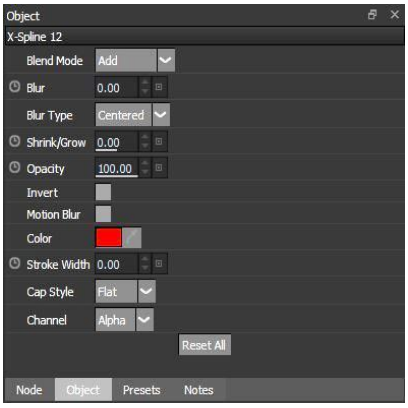


Fig. 4.14 Properties of spline Courtesy-Author

Step 3. You need Stroke Width to perform hair roto. You can also change its color either from object window or from object list as shown in Figure 4.15 (a). Don't increase stroke width more than 2px for hair roto.

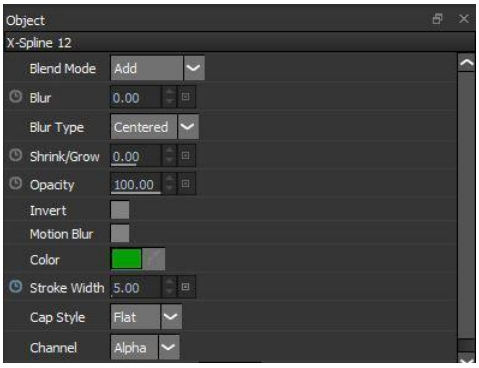


Fig. 4.15 (a) Spline Properties on object window

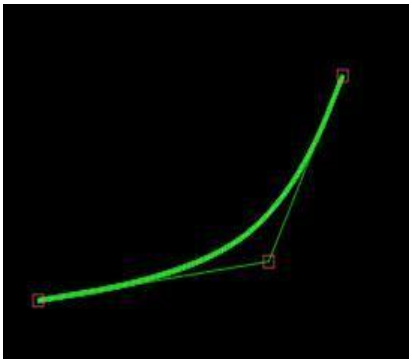


Fig. 4.15(b) Spline Courtesy-Author

Step 4. You can watch its alpha view as shown in Figure 4.16.

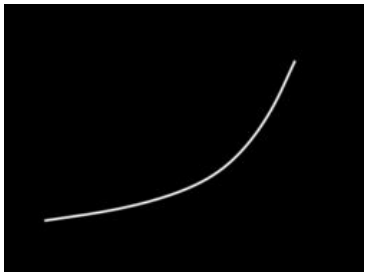


Fig. 4.16 Alpha View Courtesy-Author

Open poly is very useful in hair roto. Now you have open poly in your tool list to deal with these hair stragglers but how can you select the first hair straggler. Start with simplest straggler which has their shape majority of time and movement easy to figure out. We will discuss it when animate these stragglers. Now create shape for these strands and stragglers as demonstrated in Practical.

Practical Activity 4.2 – Demonstrate to Isolate strands and stragglers hair shapes of given person by using Open poly.

In Practical Activity 4.1, we have created basic shapes of hair for focus object. Now we will create shapes for strands and straggler.

Step 1. Take an overview of the focus object with basic shapes. Magnify the strands which are located on the upper section of the head. Observe these stranglers as shown in Figure 4.17.

Fig. 4.17 (a) Basic shapes of focus object Courtesy-Author

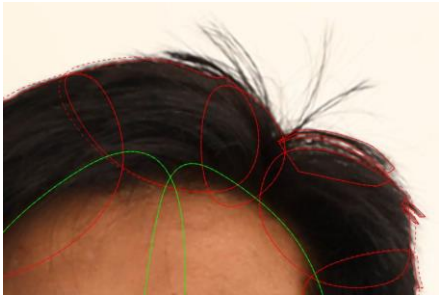


Fig. 4.17 (b) Hair stranglers

Step 2. Disable all the shape and focus on these stragglers as shown in Figure 4.18.

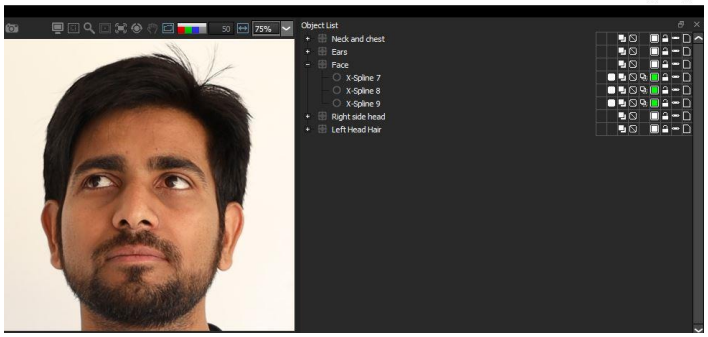


Fig. 4.18 Disable shapes Courtesy-Author

Step 3. Select X-spline or any other spline tool and create open poly shapes for these stranglers. Create one colour for each strand which helps you during movement. Ensure that all these shapes have their root in head. After creating shape, increase its stroke width by 2px in object window, as shown in Figure 4.19.

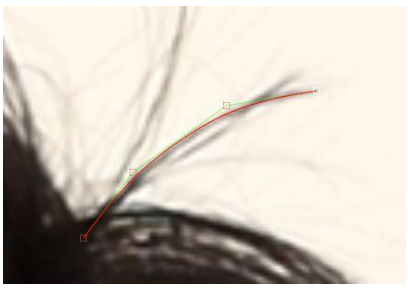


Fig. 4.19 (a) Open shape

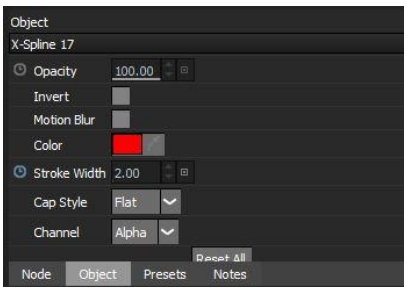


Fig. 4.19 (b) Shape properties Courtesy-

Author

Step 4. After applying the stroke over open poly, select open shape. It shows 2 handles red and green as shown in Figure 4.20 (a). Red controls the thickness of stroke while green combines blur on strokes.

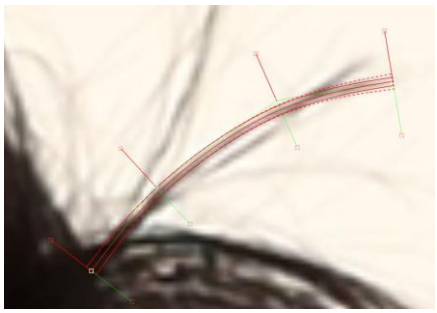


Fig. 4.20 (a) Stroke Handles

Fig. 4.20 (b) Open shape Alpha/matte view Courtesy-Author

Step 5. Create open shapes for the entire adjacent straggler and keep it on same group and colour as shown in Figure 4.21.

Fig. 4.21 (a) Group of hair strangler

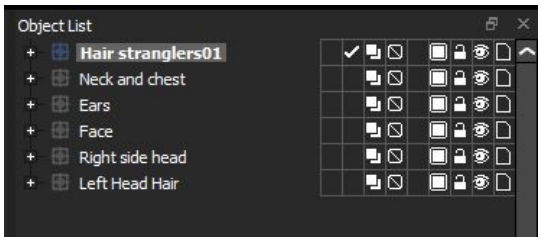


Fig. 4.21 (b) Object list

Step 6. In this way, it is possible to isolate the straggler and strands of hair as shown in Figure 4.22.

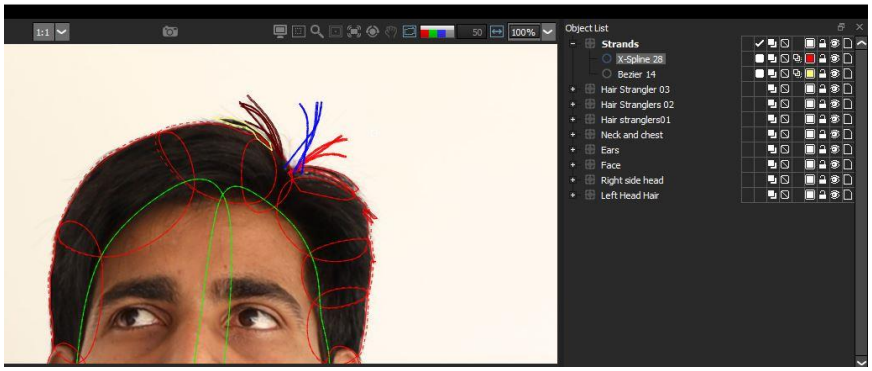
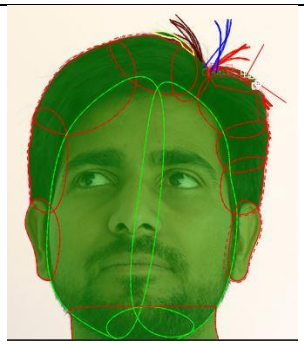


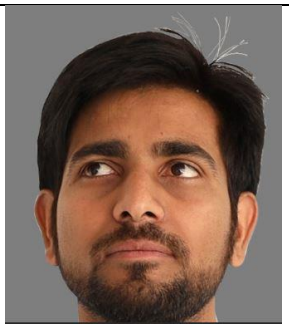
Fig. 4.22 Final result Courtesy-Author

Step 7. Observe it in different view as shown in Figure 4.23.



Colour Overlay

Matte View



Colour Composite Comp

Fig. 4.23 Different view

Till now you have learned to isolate the basic shapes and straggler hairs from a single frame. In the next chapter we will learn to create animating shapes for focus object.

Assignment 1

Shoot/download a video of a person and divide the hairs in basic shapes and standout.

4.3 Animate the shapes

To animate the shapes first animate the basic shapes and then animate strands and straggler.

Consider the following tips to animate the shapes

1. Ask your client in the beginning about the need of transparency feather or not.
2. Never use tracking while doing hair roto.
3. Never move root of hair roto.
4. Always check hair roto once you complete single hair.
5. Never add stroke and cap at the beginning of hair roto because it will affect system performance.
6. Open poly hair roto is not always necessary.
7. Always use X-Spline and B-Spline.
8. Always do prep before you roto such as stabilisation, blur requirement.
9. Complete single hair then go for others.
10. Always organise your layers and name your hairs color.
11. Make a group of 10-10 hairs.

4.3.1 Animate the basic shape

Remember these tips, while animating the shape. Now we will animate the basic shape of hair. We animate the hairs in two segments. First we will animate the basic shape of hair and then animate the strangler hair.

Practical Activity 4.3 – Animate the basic shape of hair.

Step 1. To animate basic hair shape one by one, disable all shapes except left head hair from object list. To disable the shape go to the object list and disable the visible icon.

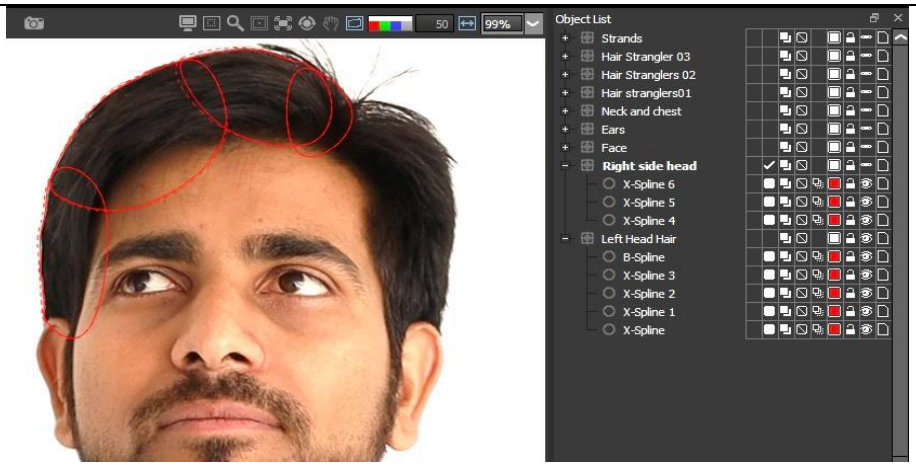


Fig. 4.24 Disable the layers Courtesy-Author

Step 2. Set 5 frame Frame-steps as shown in Figure 4.25 to skip in-between frames.

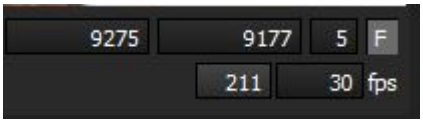


Fig. 4.25 Set frame-steps Courtesy-Author

Step 3. Press Z to move five frames backward and adjust the shape as shown in Figure 4.26.

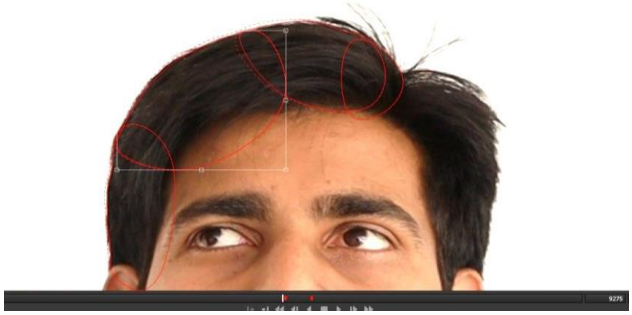


Fig. 4.26 Move 5 frames backward Courtesy-Author

Step 4. Press Z again to move 5 frames backward and adjust the shape as shown in Figure 4.27.

Fig. 4.27 Move backward again Courtesy-Author

Step 5. Use transform tool while animating the shape. After transform, use reshape tool if required to adjust the shape. By using this technique, you can animate backward frames. The frames before and after the transform are shown in Figure 4.24.

162th frame (before) 162th frame (after)

150th frame (before) 150th frame (after)

Fig. 4.28 Modify the shapes Courtesy-Author

Step 6. By using this technique, you can modify and animate basic shape of hair.

4.3.2 Animate the standout shape

After animating basic shape, next animate standout hair. During this, you will animate open poly. Remember the following points while animating standout hair.

1. Never left open shape in middle, which you select for animate.
2. Complete selected open shape first, and then move to another shape.
3. The root of hair should always be in the head.
4. Apply the stroke on open poly at the end.
5. Never use blur and cap in hair open shape.
6. Use the stroke width of 1 or 2 pixels for single hair.
7. Animate the selected hair until it disappears.

Practical Activity 4.4 – Demonstrate to Animate the standout shape of hair.

Step 1. Disable all the shape except the open poly which is to be animated (Figure 4.29).

Fig. 4.29 Enable hair strand Courtesy-Author

Step 2. Disable its stroke. Enable it after completing animation (Figure 4.30).

Fig. 4.30 Disable stroke Courtesy-Author

Step 3. Move backward frame by frame by pressing Z on keyboard as shown in Figure 4.31 and animate the spline according to selected hair till the shape disappears.

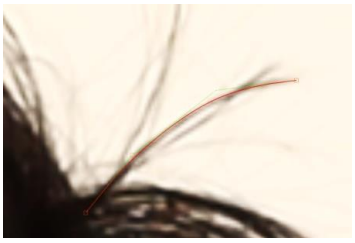


Fig. 170th Frame

Fig. 166th Frame

Fig. 162th Frame

Fig. 158th Frame

Fig. 152th Frame

Fig. 148th Frame

Fig. 4.31 Animating the shapes Courtesy-Author

Step 4. Once the roto of single hair is completed, enable the stroke width as shown in Figure 4.32.

Fig. 4.32 (a) Stroke Width

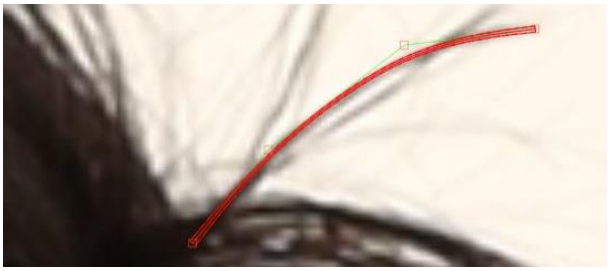


Fig. 4.32 (b) Stroke applied on open shape

Step 5. Animate the other hairs, in same group (Figure 4.33).

Fig. 4.33 Animate group of hairs Courtesy-Author

Step 6. Apply stroke widths to all shapes. Press 'A' twice to enable alpha view and watch the Matte.

Fig. 4.34 Alpha View of different frames Courtesy-Author

Summary

- In Hair rotoscoping, classified hair in two shapes- Basic and standout.
- Basic shapes are a section of hair which appears in whole and has definable edges. They will not change their contour to great extent.
- Standout is a kind of straggler hairs that is not covered by basic shapes.
- Use Open Poly/open shape to create Hair standout shapes.
- Animate the hairs in two segments. Initially animate the basic shape and then strangler hair.
- Complete selected open shape first, and then move to another shape.

CHECK YOUR PROGRESS

A. Multiple Choice Questions

1. In hair rotoscoping, you need to divide hairs in (a) Basic shape (b) Standouts (c) Basic shape and standouts (d) Simple and complex shape
2. In hair rotoscoping, basic shapes change their (a) Root (b) Path (c) Contour (d) Thickness
3. Before creating the basic shape of hairs, select video frame which have (a) Shapes (b) Sharpness (c) Complete shapes and sharpness (d) Blurriness
4. In hair rotoscoping, you do not need _____ spline (a) X Spline (b) B Spline (c) Bezier (d) Circle
5. You can change spline's colour from (a) Object list (b) Trees window (c) Viewer (d) Sources window
6. In hair rotoscoping, Standouts are (a) Group of hairs (b) Single hair (c) Hair stragglers (d) Straight hairs
7. In open poly always keep (a) overlapping shapes (b) different shapes close each other (c) Colour of the shapes same (d) Opacity of the shape minimum
8. When you click open poly shape in viewer it shows (a) Red and blue handle (b) Yellow and Red handle (c) Red and Green handle (d) Red handle
9. Create open shapes for the entire adjacent straggler and keep it on (a) Same group (b) Same colour (c) Same opacity (d) Same group and colour
10. In hair rotoscoping, first you need to animate (a) Individual strand (b) Hair Stragglers (c) Basic shape (d) Complex shape

B. Fill in the blanks

1. The section of hair which appears in whole and has definable edge is called_____.
2. Always confirm from _____ that they need edge feather on the matte or not.
3. You can change stroke width color either from _____ or from object list.
4. Start with simplest straggler which has their shape _____.
5. In stroke width, red controls the_____ of stroke.
6. Always check hair roto once you complete _____.
7. The____ of hair should always be in the head.

C. True or False

1. You can increase stroke width more than 2px for hair roto.
2. Don't use tracking while doing hair roto.
3. During hair roto, organize your layers and name your hairs color.
4. To identify strands, magnify the frame.
5. Apply the stroke on open poly at the end.

D. Answer in short

1. How can you divide the various shapes in hair rotoscoping?
2. What is basic shape? Write its qualities.
3. What is standout? How to identify these shapes?
4. What is the use of open poly in hair rotoscoping?
5. What are the different controls of stroke width? How it is useful.
6. What are the important tips you need to consider before animating the shape?

Module 3 Advanced Roto Techniques and Applications

Module Overview

There are some amazing nodes in SilhouetteFX©, such as Power matte and zmatte node which can make your work easier. In this unit, you will understand the uses of these two nodes.

Power Matte uses trimap, which has three regions into image – Foreground, that you want to cut, background that you want to get rid of and unknown. There are two methods used to generate these regions – Open shape and close shape method. zMatte is another node, that creates matte quickly and simply by using minimum parameters. It uses two methods – (i) green/blue screen keying (ii) without blue/green screen.

Further, in this unit, we will discuss about different issues of video footage which we are commonly known as scene salvage. Most of the time, it is preplanned post production process, such as wire removal and rig removal. Here, you will also understand its repairing methods like clone brushes and clean plates. Next, it reveals the secret behind 3 and you will understand 3D basics like stereography, convergence and many more. Further we will discuss about stereo conversion method, which is largely used to convert flat 2D film into 3D. It is a post-production technique. At the end of the unit, you will understand the technique of stereo roto which is a main part of stereo conversion workflow.

Learning Outcomes

After completing this module, you will be able to:

- Explore key nodes in Silhouette software and how they can be utilized for efficient rotoscoping.
- Demonstrate techniques for salvaging and restoring problematic scenes in visual effects workflows.
- Understand the process and techniques for stereo rotoscoping to create depth and dimensionality in 3D visual effects.

Module Structure

Session 1: Useful Nodes of Silhouette

Session 2: Scene Salvage

Session 3: Stereo Roto

Session 1: Useful Nodes of Silhouette

A lot of attention is required when performing roto, especially in the edge because it can create jitter and spoil all the work done. In reality, you need to draw rough outlines to extract the shape. In this this chapter, you will go through some amazing nodes which can make your work easier.

Using proprietary matte extraction techniques, the Power Matte and zMatte node are capable of extracting almost any object in an image quickly and simply even if you are dealing with fine hair detail, smoke, or reflections. They are easy to use and provide the tools required for good, bad, or ugly shots.

1.1 Power Matte

Power Matte is an easy to use interactive image matting tool. It is capable of extracting almost any object in an image. It is essential to know about the foreground and background when working with Power Matte. Figure 1.1 shows the foreground and background area.

Foreground – Area within the frame which you want to extract.

Background – Area which you want to remove from the frame.

Fig. 1.1 Foreground and Background, Courtesy- pixabay.com

Once you draw shapes on these areas, Power matte continuously estimates the transparency value for every pixel in the image, based on a small sample of foreground

and background pixels. This method is more efficient and requires minimum effort to isolate high quality mattes for foreground. Since shapes are required for Power Matte, it has its shape tools similar to those in the Roto node.

1.1.1 Matte Creation

Power Matte uses open or closed shapes to define the object to isolate or extract. Here, the shapes can be loose and don't need to follow exactly around the edges as shown in Figure 1.2 (a) & (b). Areas not defined by shapes are considered unknown areas and are automatically computed by Power Matte.

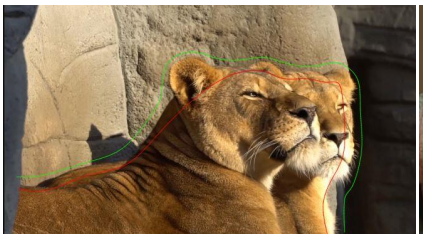


Fig. 1.2 (a) Open Shape

Fig. 1.2 (b) Close Shape

1.1.2 Trimaps

Power Matte generates an immediate matte result by using foreground and background shapes called a Trimap. A pre-segmented image is created by using trimap consisting of three regions – foreground, background and unknown. Foreground is a portion of the image to cut out. Background is a portion of the image to get rid of. The remaining part of the image is referred as unknown. Partial opacity values are then computed only for pixels inside the unknown region. There are two Trimap methods used: (i) Open Shape and (ii) Closed Shape. When creating mattes, start with the Open Shape Method and move on to the Closed Shape Method if the results are not satisfying.

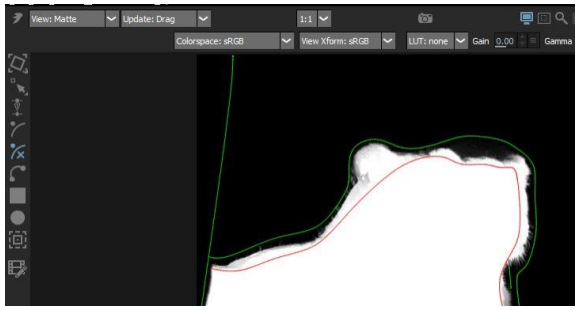


Fig. 1.3 Trimap

1.1.3 Open Shape Method

In open shape method, Power Matte needs few open shapes to define foreground and background area of the image. The areas which are not covered either by foreground or background shapes are considered unknown areas and partial opacity value is being computed in this area.

Open shape method requires little user input. However when the colour ambiguity presents between foreground and background, the closed shape method creates more accurate matte results. You should know the fact that open shape method requires slightly longer time to render as it requires extra calculation steps.

Practical Activity 1.1 – Demonstrate to extract an object by using open shape method.

Step 1. Import some source footage as shown in Figure 1.4 and create a session.

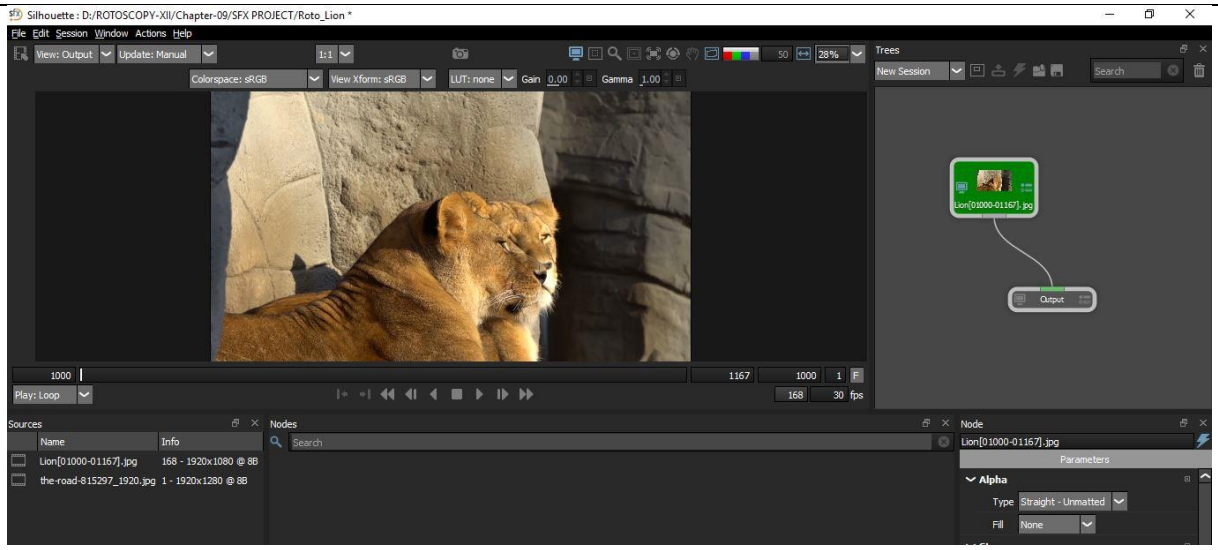


Fig. 1.4 Create a session Courtesy-Author

Step 2. In the Trees window, insert Power Matte node and connect it to the source node as shown in Figure 1.5.

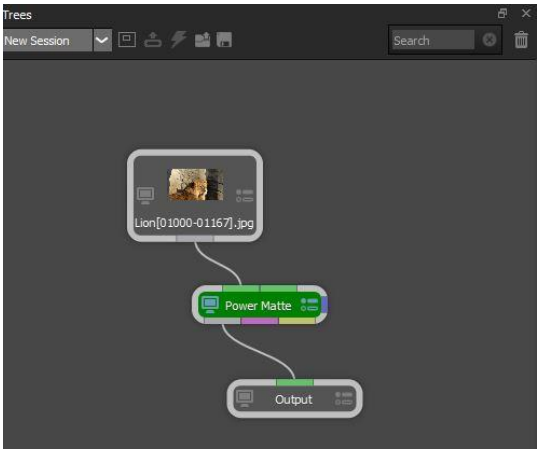


Fig. 1.5 Insert Power Matte node Courtesy-Author

Step 3. Single-click in the centre of the Power Matte node to view and edit the Node as shown in Figure 1.6.

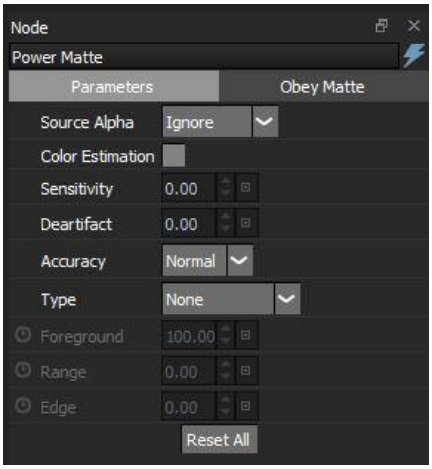


Fig. 1.6 Power Matte node Parameter

Step 4. Define foreground area by drawing an open shape around the inner edge of the object as shown in Figure 1.7. For this, select Bezier, B-Spline or X-Spline from the Toolbar.

Fig. 1.7 Foreground Area Courtesy-Author

Step 5. When finished adding points, press the Esc key to finish the open shape.

Step 6. Now, you need to draw shapes to define background areas as shown in Figure 1.8.

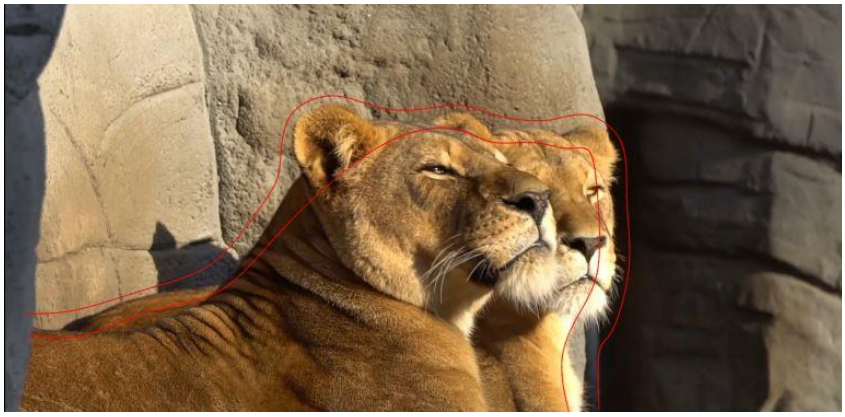


Fig. 1.8 Background Area Courtesy-Author

Step 7. In the Object List, feel free to change the name and color of your shapes as shown in Figure 1.1.

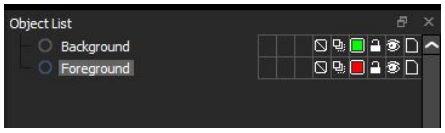


Fig. 1.9 Object List Courtesy-Author

For example, name the inner shape Foreground and change the color to red. Also, name the outer shape Background and left their color set to green as shown in Figure 1.10. Although this is not a necessary step, it helps to identify the shapes are being used for. Power Matte won't process until you assign the shapes as either foreground or background.

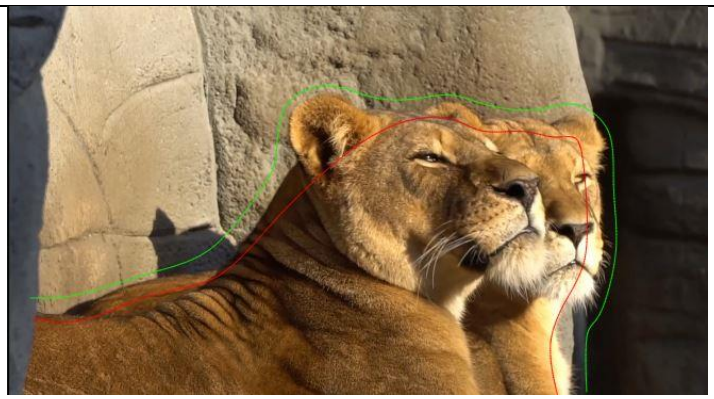


Fig. 1.10 Foreground and background shape's colour Courtesy-Author

Step 8. Select the inner, foreground shape in object list as shown in Figure 1.11 (a) and set type to Foreground in the Object window as shown in Figure 1.11 (b).

Fig. 1.11 (a) object list Courtesy-Author

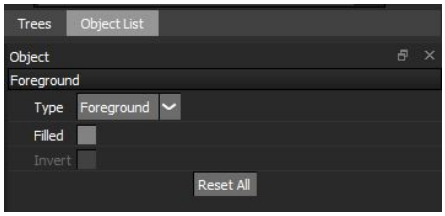


Fig. 1.11 (b) object Properties Courtesy-Author

Step 1. Select all the outer, background shapes in object list and set the type to Background in the Object window as shown in Figure 1.12 (a) & (b).

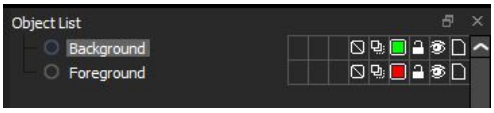


Fig. 1.12 (a) object list Courtesy-Author

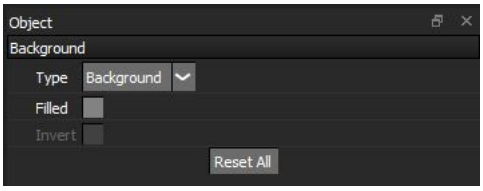


Fig. 1.12 (b) object Properties Courtesy-Author

Step 10. Draw as many as required open shapes as shown in Figure 1.13. Make sure to set its type like foreground or background in **object window.**

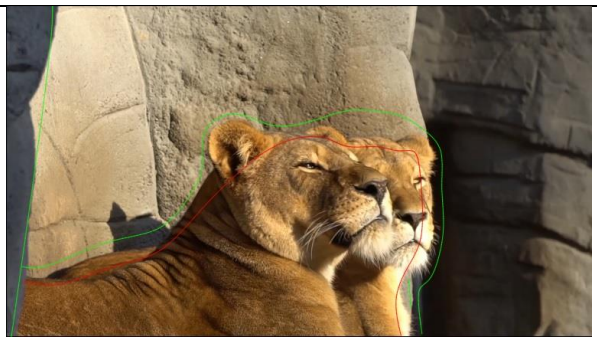


Fig. 1.13 Draw additional open shapes Courtesy-Author

Step 11. Once a foreground and background shapes are assigned, Power Matte processes the Matte, as shown in Figure 1.14.

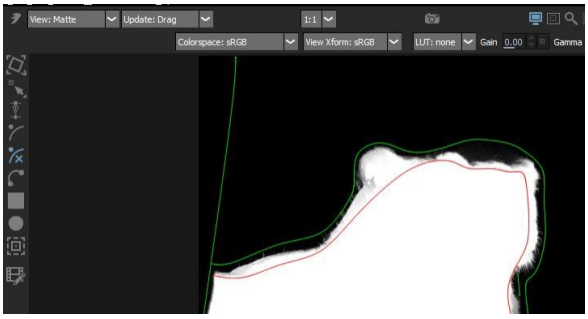


Fig. 1.14 Matte Display Courtesy-Author

Step 12. The Viewer displays the composite of foreground over the background based on your shapes. Import background object on project and connect it with background node of power matte as shown in Figure 1.15 (a) & (b).

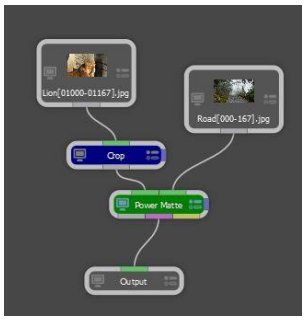


Fig. 1.15 (a) Connect background node Courtesy-Author

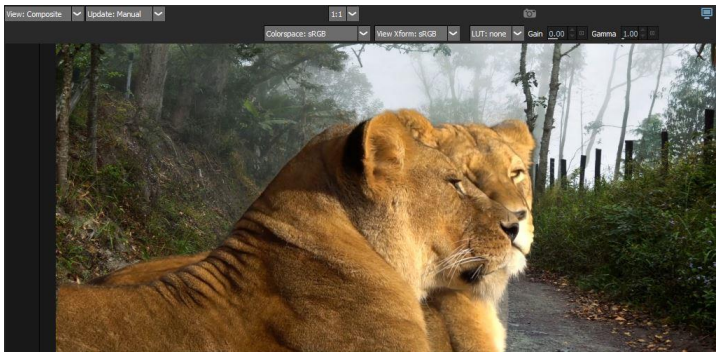


Fig. 1.16 (b) Composite View Courtesy-Author

Step 13. Now you need to animate the open shape according to movement of object, first set the View to Foreground. This way Power Matte is not constantly trying to update when you change a parameter.

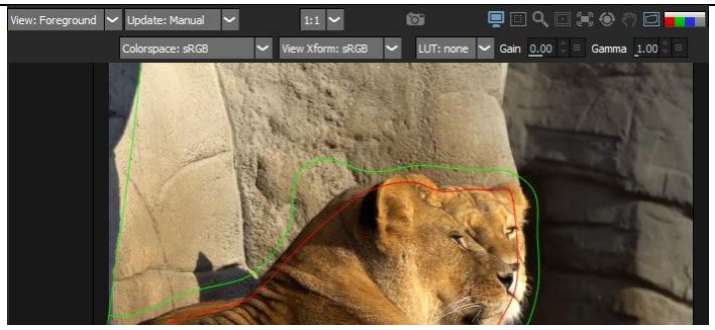


Fig. 1.17 Foreground view Courtesy-Author

Step 14. Animate the foreground and background shapes over time so that they follow the motion of focus object. However, since you already assigned the shapes as foreground and background, Power Matte will try and update every time you adjust the shapes.

It is best to use the Tracker (Shift-T) to animate the motion of your shapes as it will most likely ensure that the motion is consistent from frame to frame.

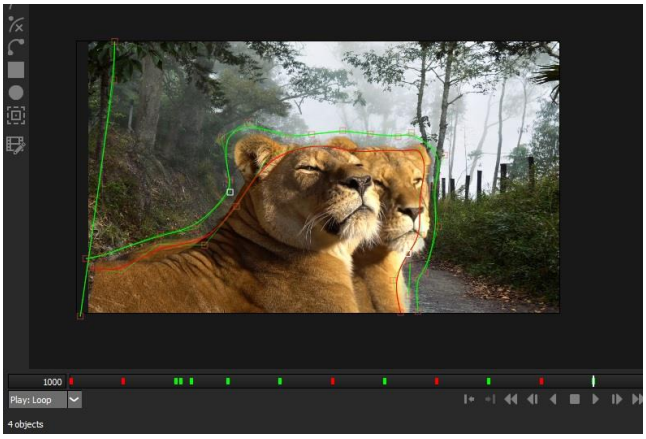


Fig. 1.18 Animate the shapes Courtesy-Author

Step 15. Play back the clip, to make sure that the shapes are properly following object.

Step 16. Use **View > Matte** to display the generated matte.

Step 17. Hit the Play button to check your results. When you hit the Play button, Power Matte renders each frame.

Step 18. If at any time you want to turn off the display of the shapes, click the Overlay icon above the Viewer or press 0 (number zero) shortcut key.

In the generated matte, foreground white is, background is black and any gray areas in between represent a level of transparency as shown in Figure 1.19. If the matte is not acceptable after processing, you can either adjust the shapes or add additional shapes near the region where the matte is not accurate.

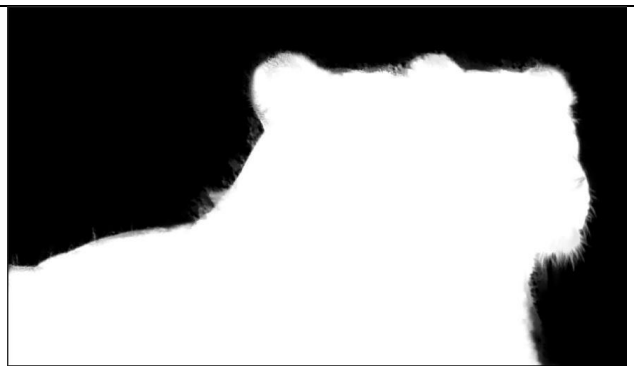


Fig. 1.19 Foreground, background and transparency in a matte Courtesy-Author

Fig. 1.20 Composite view of matte Courtesy-Author

More to Know

If you see gray areas in the foreground object that should be completely white, make additional foreground shapes in those areas.

If you see gray areas in the background that should be completely black, make additional background shapes in those areas.

Gray values in Unknown areas can be reduced by increasing the deartifact value located in the Node parameters.

You can enhance computer performance while using Power matte by either:

Set the **View** to Foreground while editing shapes. Set the **Update mode** to Manual and hit the Enter key when you want to process as shown in Figure 1.21

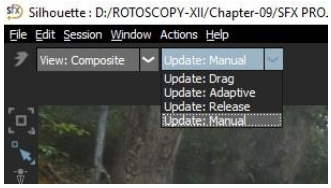


Fig. 1.21 Manual Update Mode Courtesy-Author

Use a lower quality proxy image by using the Proxy pull-down menu above the Viewer, as shown in Figure 1.22.

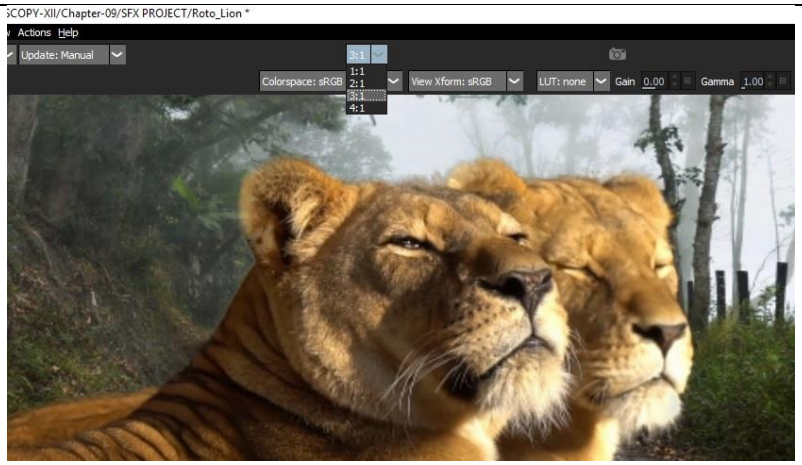


Fig. 1.22 Proxy Size Setting Courtesy-Author

To remove fringing around the object being cut out, go to the Node parameters and turn on Color Estimation as shown in Figure 1.23.

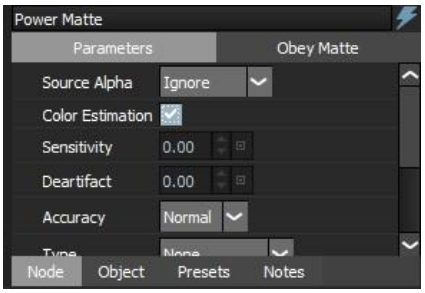


Fig. 1.23 Colour Estimation Courtesy-Author

More to Know

Colour Estimation – It estimates the colours of foreground in unknown and semi-transparent areas. Colour estimation is Off by default and when activated, it prevents fringing which is needed for smooth compositing as shown in Figure 1.23 (a) & (b).

Fig. 1.23 (a) Colour Estimation OFF

Fig. 1.23 (b) Colour Estimation ON

Courtesy-SilhouetteFX.com

Open Shape Method Tips

- Make sure to draw enough foreground and background shapes. Always draw, open inner shape within the object and outer open shape outside the object.
- The shapes are created near the boundary of the object, yet it is not drawn exactly over the object.
- Keep the foreground and background shape in different colour, it will help you to identify the object, also you should keep the foreground and background object colour in mind, so that you can select contrast colour.

- While viewing the matte, if you find any gray areas in the foreground object then do necessary change in foreground shapes to make it completely white. If you see gray matte areas in the background that should be completely black.
- The general rule is, to not put different foreground and background shapes too close together unless you need it.

1.1.4 Closed Shape Method

In Close Shape method, closed shapes are used to mark definite foreground and background area of the image. The areas, which is not comes under these two are consider as unmarked area. For these areas, partial opacity value is computed for the pixels. So, always try to keep any hair details, transparent or blurry portions under these unknown areas.

Table 1: Difference between Open Shape and Closed Shape method

Characteristics/situations	Open Shape	Closed shape
Regions	Foreground, background and unknown	Foreground, background and unknown
Method used	Uses open shape to mark foreground and background area	Uses closed shape to mark definite foreground and background area
Trimap process	Slightly Slower	Faster
If colour ambiguity exist in Foreground and background	Not working	Create more accurate matte
Foreground object with background holes	Used in this situation	Cannot handle

Practical Activity 1.2 – Demonstrate to extract an object by using Close shape method.

Step 1. Import some source footage and create a session, as shown in Figure 1.24.

Fig. 1.24 Import footage and create session Courtesy-Author

Step 2. In the Trees window, add a Power Matte node between source and output, as shown in Figure 1.25.

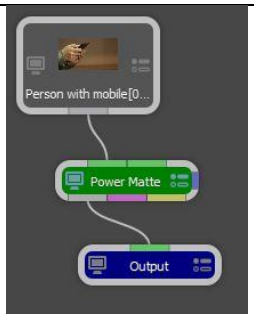


Fig. 1.25 Power Matte Node Courtesy-Author

Step 3. Define foreground area by drawing a closed shape. Draw a shape around the inner edge of the object as shown in Figure 1.26. To close the shape, click on the first point that you created.

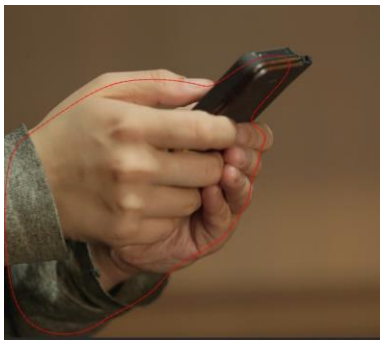


Fig. 1.26 Closed Shape Courtesy-Author

Step 4. To inform Power Matte that you are using a closed shape, enable **Filled** in the Object window as well as set the type of shape to **Foreground** as shown in Figure 1.27.

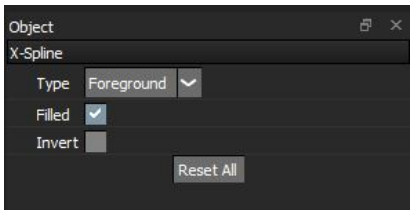


Fig. 1.27 Enable Filled in object window Courtesy-Author

Step 5. Now, draw closed shapes to define background area as shown in Figure 1.28. It is the area which you want to remove from the clip.

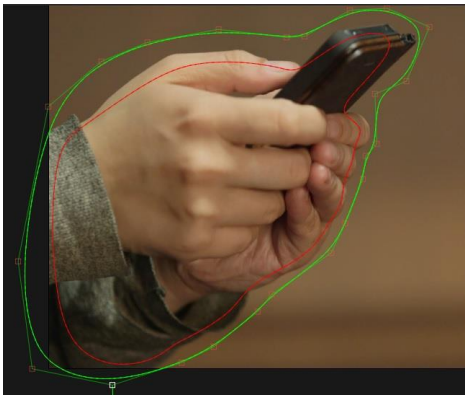


Fig. 1.28 Draw background area Courtesy-Author

Step 6. After drawing the background shape, enable **Filled** in the Object window and set the Type for this shape to Background as shown in Figure 1.29. Don't forget, to click on invert box, because background area is opposite side from closed shape.

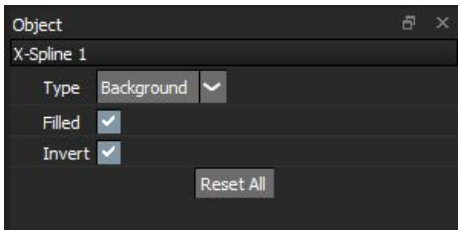


Fig. 1.29 Enable Filled in object window Courtesy-Author

Step 7. As foreground and background shapes are assigned as shown in Figure 1.30. Power Matte processes the Matte.

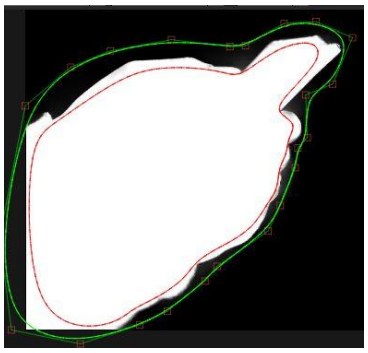
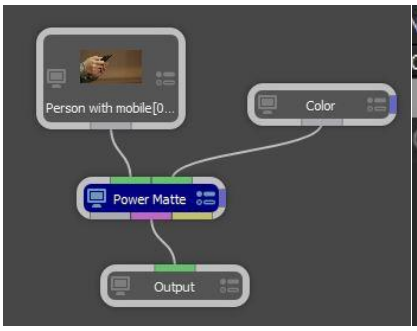


Fig. 1.30 Matte View

Step 8. You can use color node as a background and can change its color on **object** window as shown in Figure 1.31.



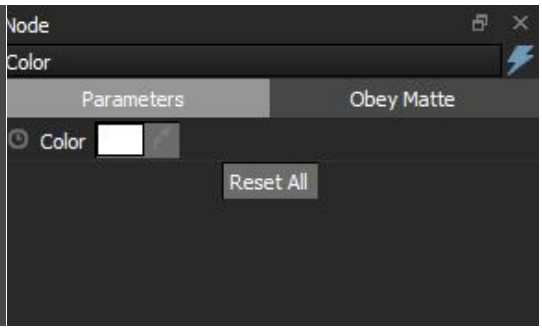


Fig. 1.31 (a) Color Node **Fig. 1.31 (b) Node Window**

Step 1. The **Viewer** displays the composite of the foreground over the background based on your shapes, as shown in Figure 1.32.

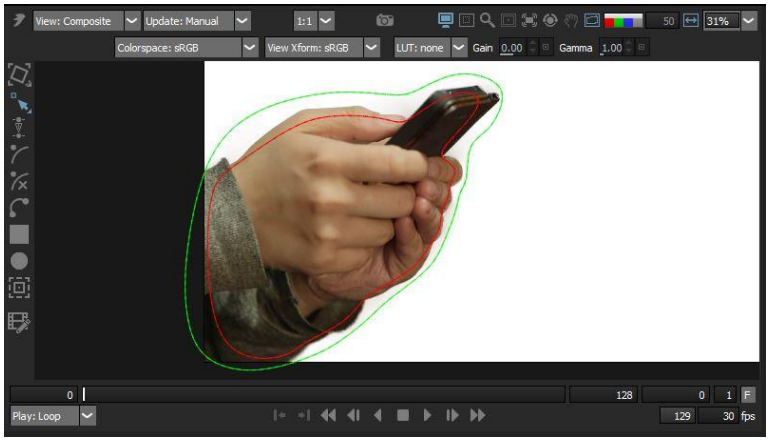


Fig. 1.32 Composite View Courtesy-Author

Step 10. Animate the foreground and background shapes over time as shown in Figure 1.33. For this either use key frame bifurcation technique or choose tracker.

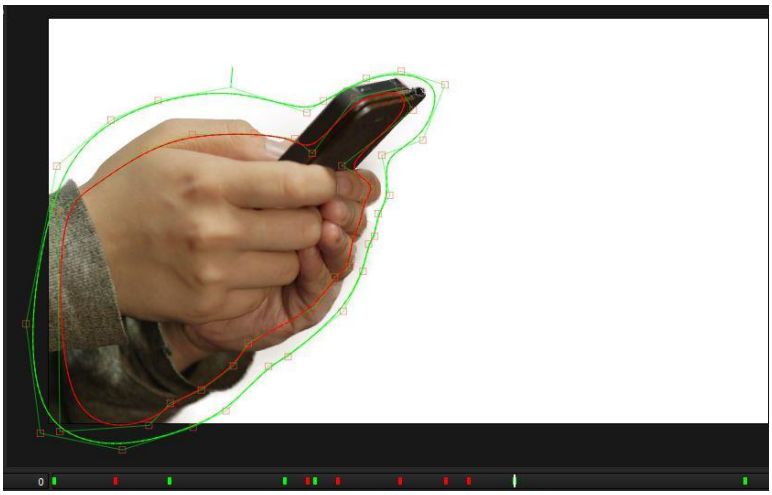


Fig. 1.33 Animating the shapes Courtesy-Author

Step 11. Use **View > Matte** to display the generated matte.

Step 12. Hit the **Play** button to check your results so far.

Step 13. At any time if you want to turn off the display of the shapes, click on 0 (number zero as shown in Figure 1.34 (a) & (b)).

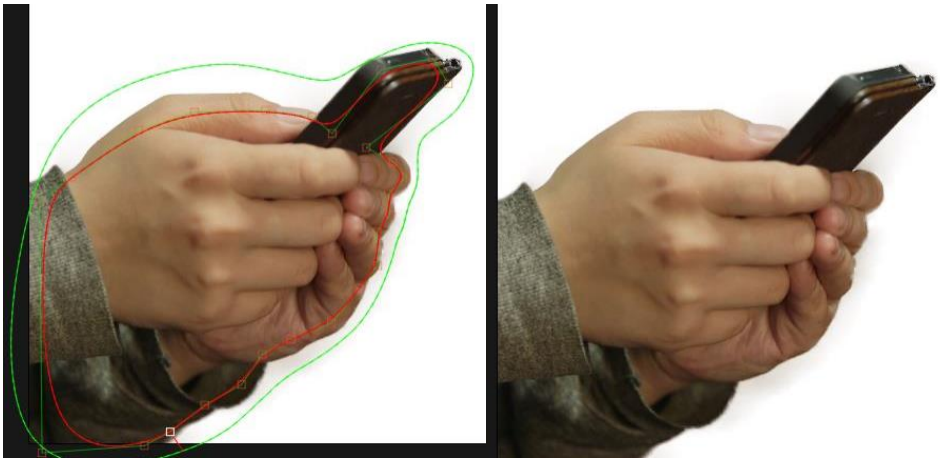


Fig. 1.34 (a) Overlay ON **Fig. 1.34 (b) Overlay OFF**

Choose **View > Composite** to display the Composite.

Closed Shape Method Tips

If the foreground object is completely surrounded by background, a quick way to define the background area is to first draw a closed shape around the outside of the foreground and then invert the shape in the Object Parameters.

Ideally, the unknown region, which is not defined with foreground or background shapes, should only cover transparent pixels whose actual values are not completely foreground or background. In other words, the unknown region includes hair detail, transparent or blurry portions of the image.

1.2 zMatte

In first glance, you can interpret zmatte as a chroma key tools but it is far better than that. Using proprietary matte extraction techniques, zMatte quickly and simply creates

mattes with minimal parameters even if you are dealing with fine hair detail, smoke, or reflections.

zmatte creates mattes using:

- Green/Blue screen keying
- Generating matte without blue/green screen

1.2.1 Green/Blue screen keying

zMatte can be used to create single matte for blue/green screen footage. Here you have two options to use inner/outer keying method.

- **Primary matte –** It has gray values in the foreground's edge. This will give a nice, smooth edge in the final composite.

1. **Secondary matte –** It is used to fill in any gray areas of the Primary Matte while retaining the gray values in the edge. You can do this by adjusting the Blur, Shrink/Grow and/or Wrap parameters of the Secondary Matte to retain the Primary Matte's edge values.

So let's create single matte for blue screen footage.

Practical Activity 1.3 – Create matte for blue screen footage by using green/blue screen keying.

Step 1. Import some green or blue screen source footage and create a session as shown in Figure 1.35.

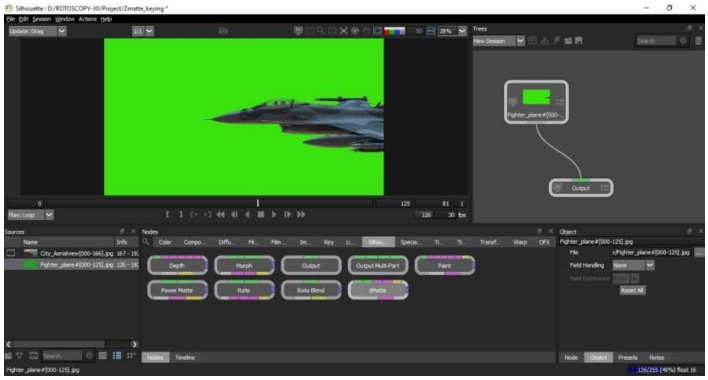


Fig. 1.35 Import Source footage Courtesy-Author

Step 2. In the Trees window, add a zMatte node between source and output node as shown in Figure 1.36.

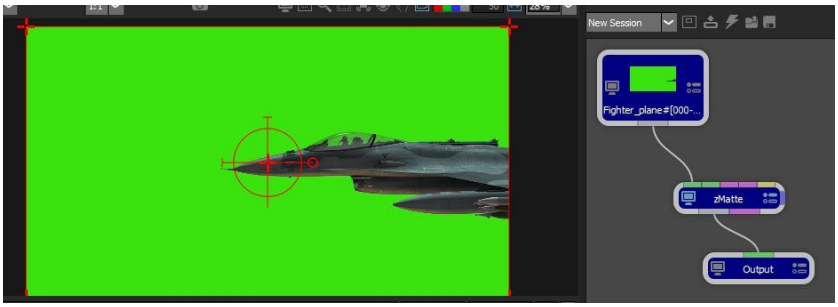


Fig. 1.36 Insert zMatte Node Courtesy-Author

Step 3. Click on the center of the zMatte node to view and edit it.

Step 4. Select Primary Matte from the View pop-up menu as shown in Figure 1.37.

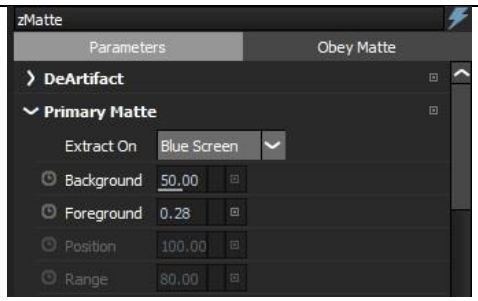


Fig. 1.37 Primary matte Courtesy-Author

Step 5. Set the Primary **Matte > Extract**; On to Blue or Green Screen as shown in Figure 1.38.

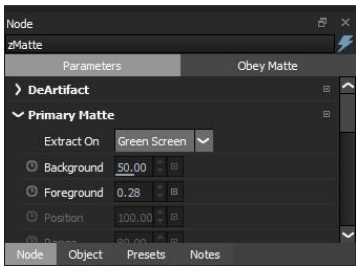


Fig. 1.38 (a) Extract on green screen

Fig. 1.38 (b) View impact on viewer

Step 6. From the view menu, select primary matte, as shown in Figure 1.31.

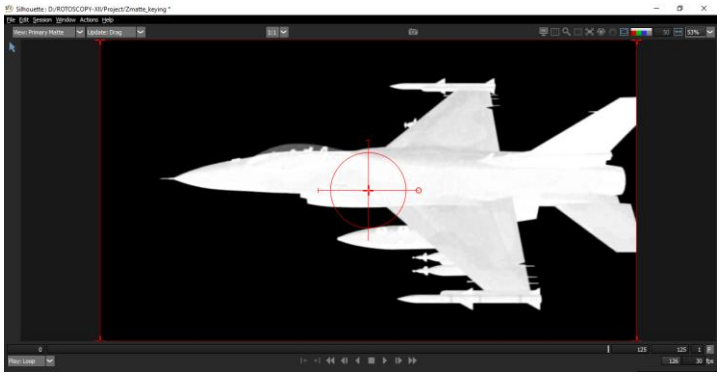


Fig. 1.39 Primary Matte View Courtesy-Author

Step 7. Adjust the Background slider, as shown in Figure 1.40, so that the background area will completely black

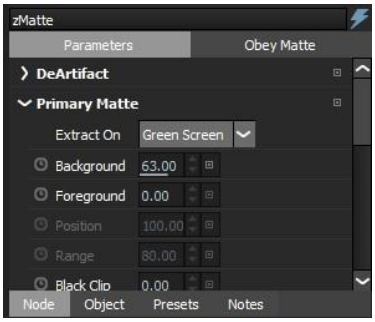


Fig. 1.40 (a) Adjust background slider Courtesy-Author

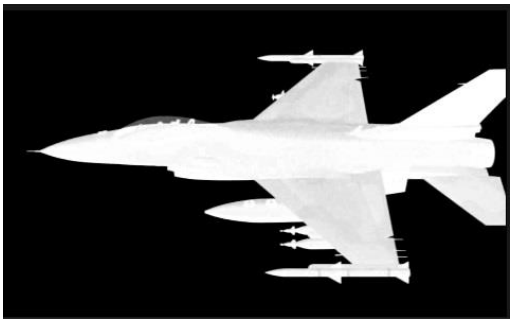


Fig. 1.40 (b) Primary matte View

Step 8. Set the Foreground slider as shown in Figure 1.41, so that the Primary Matte has gray values, especially in the edges.

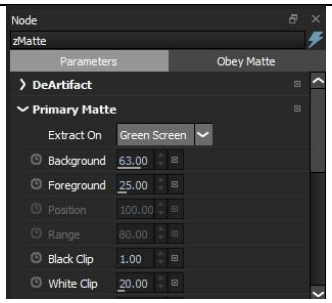


Fig. 1.41 (a) Adjust Foreground slider Courtesy-Author

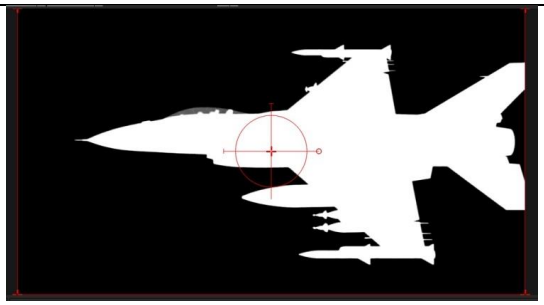
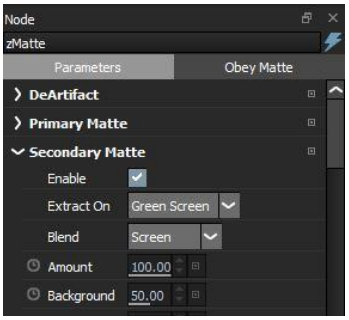


Fig. 1.41 (b) Primary matte View

Step 1. Expand the Secondary Matte group and click on the **Enable** checkbox as shown in Figure 1.42 (a). You can see the Secondary Matte in the Viewer as shown in Figure 1.42 (b).



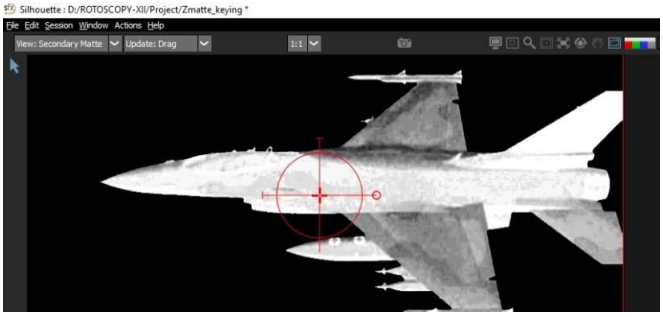


Fig. 1.42 (a) Enable Secondary Matte

Fig. 1.42 (b) Secondary Matte View

Step 10. Set the Secondary Matte > Extract On to the same setting as the Primary Matte.

Step 11. Adjust the Secondary Matte so that the foreground is completely white and the background is completely black.

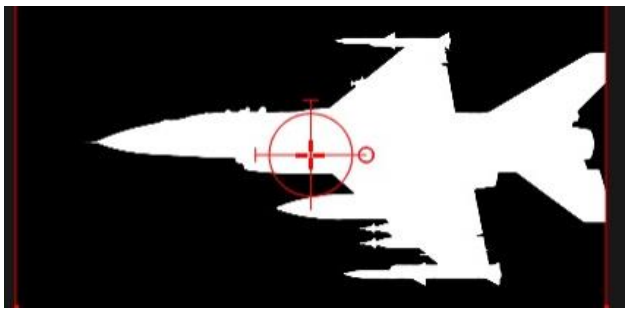


Fig. 1.43 Adjust the secondary matte Courtesy-Author

Step 12. Switch the **View** menu to Combined Matte as shown in Figure 1.43. The Combined Matte view shows the combination of the two mattes.

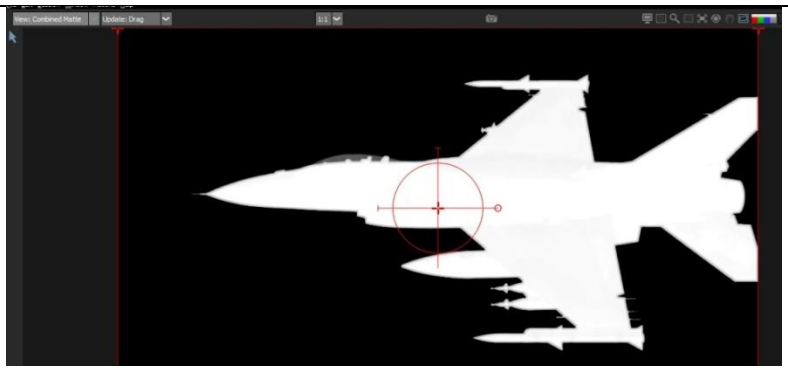


Fig. 1.44 Combined matte view Courtesy-Author

Step 13. Adjust the Secondary Matte> Wrap parameter as shown in Figure 1.45 to pull back the hard edges of the Secondary Matte to reveal the gray edges of the Primary Matte as shown in Figure 1.46.

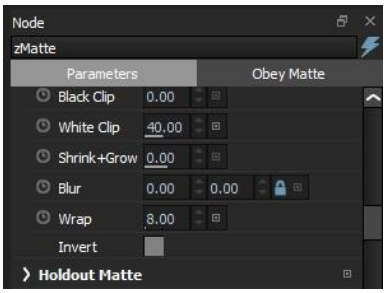


Fig. 1.45 Wrap Parameter

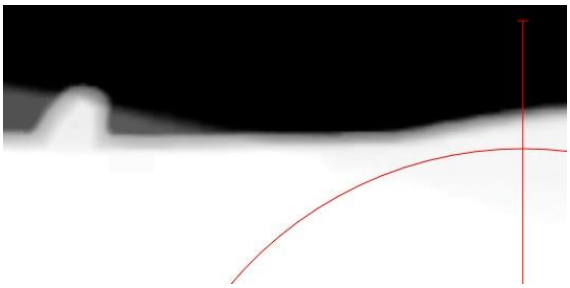


Fig. 1.46 Combined Matte View

You could also use Secondary Matte > Shrink/Grow and Blur separately or in conjunction with Wrap to blend the two mattes together.

Step 14. Change the View pop-up menu to Composite as shown in Figure 1.47. If you do not have input a background, then foreground will be composited over black.

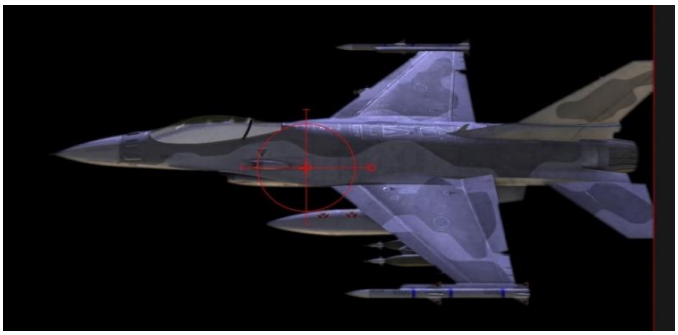


Fig. 1.47 Composite View Courtesy-Author

Step 15. If you have a video clip that you want to use for the background, then connect it in to the background input of zMatte as shown in Figure 1.48. The foreground will then be composited over the background.

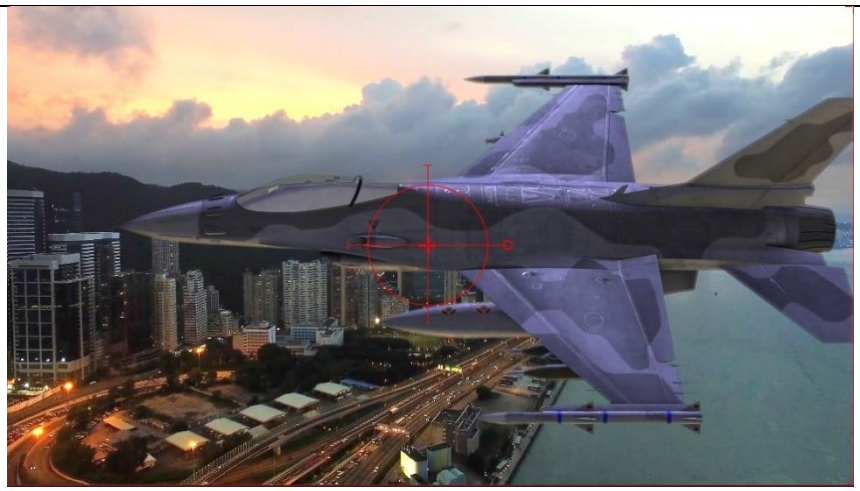


Fig. 1.48 Composite View when input background Courtesy-Author

- If you see any color spill from the blue or green screen, it can be eliminated using the Color Suppression controls.
- Expand the Color Suppression group and click the Enable check box. Adjust the Color Suppression > Foreground and Range controls as required.

Know more...

If you are not going to use the Inner/Outer Keying method, you would adjust the Foreground slider so that the foreground values would be completely white in the Primary Matte. In this case, a Secondary Matte would not be used.

1.2.2 Holdout Matte

A Holdout Matte defines foreground areas that should not be keyed out. zMatte has Holdout Matte as an auxiliary input that can come from a source image or a node like Roto. If there are foreground areas that are not keying properly, hook a Roto node into the Holdout Matte input. Roto the appropriate foreground areas and they will be added to the output matte.

Fig. 1.49 Holdout Matte

1.2.3 Garbage Matte

Garbage Matte defines background areas that should be keyed out. Garbage matte is also an auxiliary input.

If there are background areas that are not keying properly, hook a Roto node into the Garbage Matte input. Roto the appropriate background areas and they will be subtracted from the output matte.

Fig. 1.50 Garbage Matte

Summary

- Power Matte is an easy to use interactive image matting tool.
- Power matte continuously estimates the transparency value for every pixel in the image, based on a small sample of foreground and background pixels.
- There are two trimap methods are used; Open Shape and Closed Shape.
- Start with the Open Shape method and move on to Closed Shape if the result is not satisfying.
- Assign foreground and background shape to process the power matte.

- To turn off the display of the shapes, click Overlay icon above the Viewer or press 0 (number zero) shortcut key.
- zMatte quickly and simply creates mattes with minimal parameters if you are dealing with fine hair detail, smoke or reflections.

CHECK YOUR PROGRESS

A. Multiple Choice Questions

1. Foreground is the area, which you want to (a) extract from the frame (b) remove from the frame (c) superimpose in the frame (d) highlight in the frame
2. Tools of Power matte are similar to (a) Paint Node (b) Depth Node (c) Roto Node (d) zMatte
3. The following region is not included in Trimap (a) Foreground (b) Background (c) Unknown (d) Middle space
4. In Power Matte, White signifies (a) Solid foreground (b) Solid background (c) Partial opacity (d) Full transparency
5. Define foreground area by drawing an open shape around the (a) On the outer edge of object (b) Edge of the object (c) Inner edge of the object (d) Far from background object
6. Power Matte processes the matte when_____ assign (a) Foreground shape (b) Background Shape (c) Unknown Shape (d) Foreground and Background
7. zMatte cannot create mattes by using (a) Blue Screen (b) Green Screen (c) Luminance (d)Yellow screen
8. Holdout Matte defines (a) Background area that should be keyed out (b) Foreground area that should not be keyed out (c) Foreground and background area that should be keyed out (d) Background area that should be keyed out

B. Fill in the blanks

1. Power Matte uses_____ and Closed shape to create matte.
2. If you see gray areas in the background that should be completely_____.
3. Colour_____ prevents fringing to create a seamless composite.
4. In Open Shape method, the general rule is to not put different_____ shapes too close together.
5. When using a closed shape in power matte, enable Filled in the _____ window.
6. Primary matte has grey values in the _____ edge.

C. True or False

1. When creating mattes, start with the Close Shape Method and move on to the Open shape.
2. Set the Update mode to Manual and hit the Enter key when you want to process.
3. Closed Shape trimaps process slightly slower than Open Shape trimaps.
4. Adjust the wrap parameter in secondary matte, to pull back the hard edge of secondary matte to reveal the gray area of primary matte.
5. Holdout Matte comes from a source image or a node like Roto.

D. Short answer questions

1. What is Power matte?
2. What is Foreground and background area in power matte?
3. What is Trimaps?
4. Explain open and close shape method of matte creation?
5. When should open shape method use?
6. Why we should assign shape name in object list while using power matte?
7. What is zmatte?
8. What are the different methods of keying in zmatte?
9. Explain Holdout matte with its use?
10. What is Garbage matte?

Session 2: Scene Salvage

Scene salvage covers a broad range of issues. They have one common thing is to fix the errors in picture. Sometimes these are production accidents such as a scratch on the film, a hair in the gate, flashing frames, or a light leak.

Sometimes they are pre-planned post production processes such as wire and rig removal where it was planned to fix them after principal photography. Sometimes it is just a normal part of life like dust busting. Many of the tasks described here are considered entry-level work and may be the first type of job in digital compositing.

Fig. 2.1 Movie stills- wire removal Courtesy-Marvel Studio

The production accident problems are the most challenging to fix because they are by definition, unplanned acts against nature and can be complex to deal with. Some of them are simply not possible to fix. A regular VFX shot can be complex, but at least somebody sat down and thought through the best way to build the shot and prepare elements appropriately as shown in Figure 2.1.

This chapter works through several examples of common scene salvaging problems. It demonstrates many of the techniques used to perform those repairs. These repair techniques include clone brushes, clean plates, and many others.

2.1 Wire removal

The explosion, in success of wild adventure films has triggered a similar explosion in the usage of "wire gags" where a character playing the role of hero is wearing a belt under his clothes attached to wires and pulleys, as shown in Figure 2.2 (a) & (b). At the other end of the cables, the muscular guys are pulling on them at the perfect time to lift

the hero, so he can climb over tall buildings. Keep in mind that the wires must be disconnected before the shot can be used.

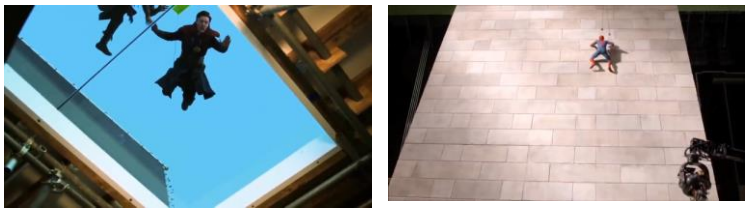


Fig.2.2 (a) & (b) VFX shots where hero is trussed up with a wire Courtesy- marvel Studio

2.2 Rig removal

When a motion control shot is done on a model, it has to be supported by some kind of armature or rig, as shown in Figure 2.3. Sometimes, the armature is static and the camera moves, but rig can also be a motion control device that moves the model around.

Fig. 2.3 Rigging of model

Assignment 1 – Study the rig removal of different character stop motion video films.

2.3 Wire /rig removal

Wire removal can be performed by two different ways.

2.3.1 Wire/Rig Removal by Painting Frame by Frame

Wire removal is performed in post-production. However, it is very tedious process, because painting on each frame is extremely difficult. In this process, we use clone tool, which is working on single frame. Cloning is much more effective, as it clones not just colour but grain and noise also, which makes the space almost similar to the adjacent place.

2.3.2 Wire/Rig Removal by Patching Over the Top

Painting frame by frame is extremely difficult. Hence it is required to find out any solution to remove the wire in faster way. First solution is to clean frame from some other point in the video clip and secondly paste it over the top of the rig or wire to remove. It works well when camera is not moving and shots are steady.

There is another approach, to create clean plate. In this process, you need to remove the wire in a single frame and use this frame as a clean plate with others frames. Observe every frame while painting, if you see any change on brightness.

Know More...

Clean Plate – A clean plate is an "empty" piece of video or still image of a scene. It has same composition, lighting and movement compare to final frame. Basically, it is a background shot, which is used in visual effects. When you need to remove any objects like wire, rig from frame. It can be any static shot or may be an aerial shot. (Figure 2.4 (a) & (b).

Fig. 2.4 (a) Video Frame

Fig. 2.4 (b) Clean Plate

2.4 Paint in SilhouetteFX©

Now use paint tool to remove the wire or rig. There are different ways of painting in SilhouetteFX©. So let us explore paint tool in SilhouetteFX©, as shown in Figure 2.5

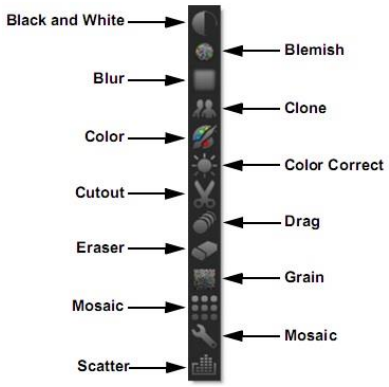


Fig. 2.5 SilhouetteFX© Paint Tools Courtesy-Author

Let's demonstrate to use these tools in Practical Activity 2.1.

Practical Activity 2.1– Demonstrate to use different paint tools.

Step 1. Import a video frames in silhouette software as shown in Figure 2.6. Observe the effects of paint tools on this frame.

Fig. 2.6 Viewer panel Courtesy-Author

Step 2. Insert **Paint node** between **source** and **output** in trees window (Figure 2.7).

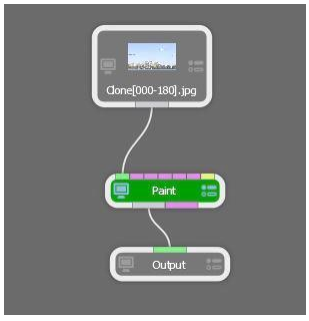


Fig. 2.7 Paint node Courtesy-Author

Step 3. Now, observe the paint tools on the extreme left as shown in Figure 2.5.

Step 4. On selecting paint tool from the tools panel, shows controls in Paint window. For instance select the clone brush and observe its control as shown in Figure 2.6.

Fig. 2.8 Paint brush controls Courtesy-Author

Step 5. Let us select paint brushes one by one and observe its uses.

Black and White

Fig. 2.9 Impact of black and white brush Courtesy-Author

Blemish – The Blemish brush is useful for removing facial blemishes on film originated footage. It combines the Blur and Grain brushes.

Blur – It blurs the images.

Clone – Paints the image using another part of the image or other image with the ability to grade (color correct), blur or sharpen the clone source. In Figure 2.10 (a) we are going to remove the rope.

Fig. 2.10 (a) Original Video Frame

Fig. 2.10 (b) Rope is removed by Clone Stroke Courtesy-Author

Colour – Paint the image with selected colour.

Colour Correct – The image is painted using colour, brightness and contrast adjustment.

Fig. 2.11 (a) Before Colour Correct **Fig. 2.11 (b) After Colour Correct**

Cut-out – cut the selection of image and paste it over the required area. The picture before cut out and after cut out is shown in Figure 2.12 (a) & (b).

Fig. 2.12 (a) Cut-out (before) Courtesy-Author

Fig. 2.12 (b) Cut-out- after (cut out the building and paste it) Courtesy-Author

Drag – Smudge or smear an area of the image. When the brush first starts, it makes a copy of the area under the brush and then on subsequent samples it stamps that area down in the new location with a blend.

Eraser – It erases previously painted brush strokes and revert the image in its original form.

Fig. 2.13 (a) Clone Stroke clean the rope

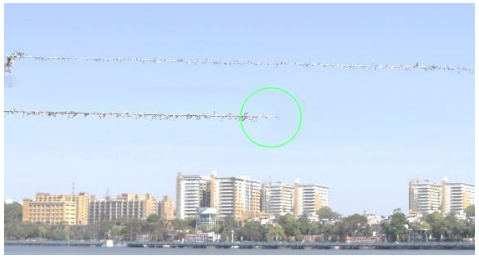


Fig 2.13 (b) Rope appears again after erased the Clone Stroke Courtesy-Author

Grain – It paints the grain over the image as shown in Figure 2.14.

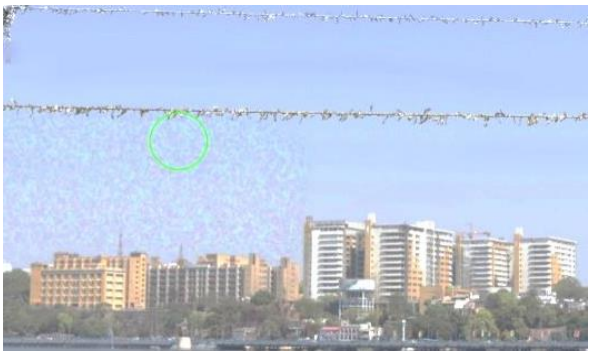


Fig. 2.14 Grain stroke Courtesy-Author

Mosaic – It divides the picture in to the square tiles as shown in Figure 2.15.

Mosaic

Fig. 2.15 Mosaic Stroke Courtesy-Author

Repair – It paints the image with the color level sampled at the beginning of each stroke.

Scatter – It scatters pixels in a random fashion.

Fig. 2.16 (a) Original Video Frame

Fig. 2.16 (b) Scatter stroke over video frame

2.4.1 Profile

Once you select paint tool, you can customize your brush setting in profile tab.

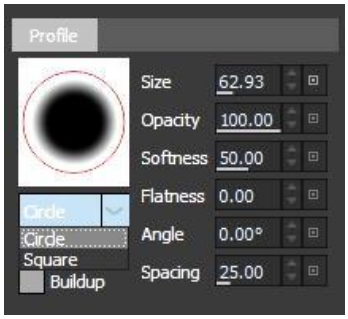


Fig. 2.17 Profile tab Courtesy-Author

In Profile tab, you can select brush type (circle or square), brush size, opacity, softness, flatness, angle and spacing.

Know More...

The size of the brush can be changed by pressing bracket **[**and**]** key. You can also resize it by holding Ctrl key and drag the left mouse key.

2.5 Paint the frame by Clone brush

Clone brush is one of the key tool used to remove the wires in the frames. In Photoshop you can remove the unwanted element from the frame. Basically it takes sample from other parts of the image and even it can take the samples from other image sources and paint it over the required place.

The controls for the Clone brush are split into three tabs – Clone Tab, Grade tab, and Warp tab as shown in Figure 2.18.

2.5.1 Clone Tab – It deals with the timing and transformation of Clone source.

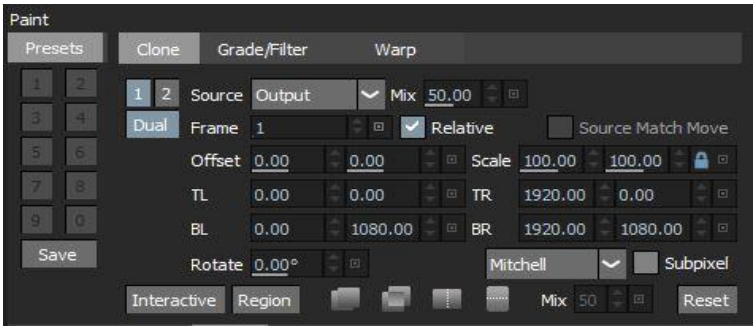


Fig. 2.18 Clone Tab Courtesy-Author

2.5.2 Source control – In clone tab, we have source control as shown in Figure 2.19, in which we select the paint source and the frame number which we will select for cloning.

Fig. 2.19 Source control Courtesy-Author

In frame number, you can select the required frame, which works as a clone source.

2.5.3 Transform Control – It enables you to position, scale, rotate, skew and corner pin the Clone source. When you select any frame as a clone source then transform control help to match it with target frame.

Fig. 2.20 Transform Control Courtesy-Author

2.5.4 Clone viewing option – It helps to position the clone source. These are onion skin overlay, align, vertical split and horizontal split.

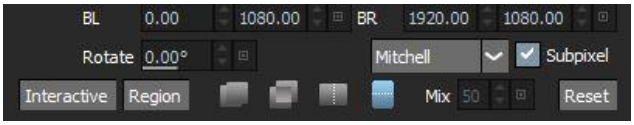


Fig. 2.21 Clone Viewing Option Courtesy-Author

Onion skin – It mixes clone sources and target.

Align – Align inverts the clone source and mixes it with the foreground.

Vertical split – Compare the clone source and target using a vertical split.

Horizontal split – Compare the clone source and target using a horizontal split. It is shown in Figure 2.22 (a) – (d).

Fig. 2.22 (a) onion skin

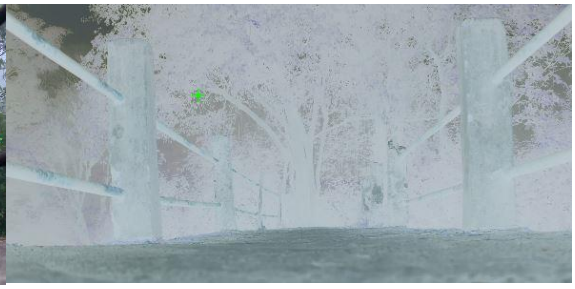


Fig. 2.22 (b) Align

Fig. 2.22 (c) Vertical Split

Fig. 2.22 (d) Horizontal Split

Let us perform an activity where we select the frame and match it.

Practical Activity 2.2 – Demonstrate to remove the frame from given video clip.

Step1. Import a video in SilhouetteFX© as shown in Figure 2.23. Create a new session and Insert paint node between source and output in **Tree** window.

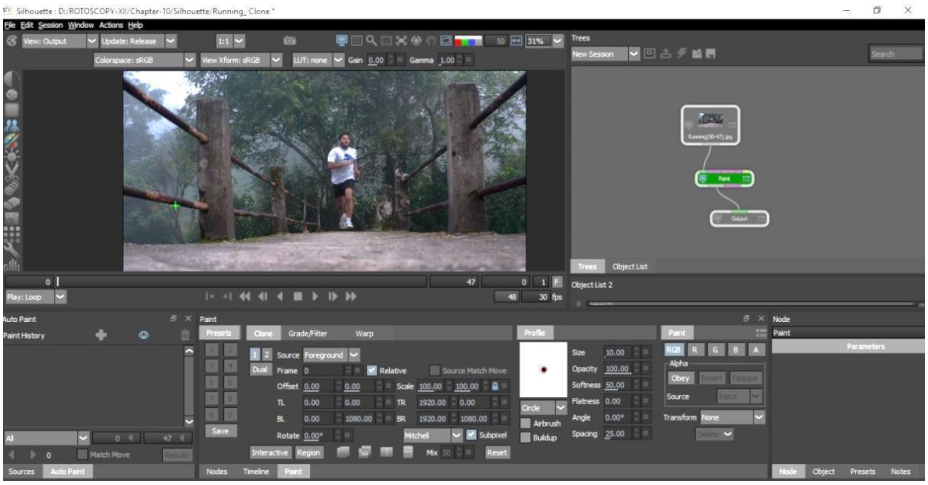


Fig. 2.23 Insert Paint Node Courtesy-Author

Step 2. Clone tool is selected in paint toolbar. Now observe the change in clone tab as shown in Figure 2.24. When you playback the video, frame number is changing on **Clone** tab.

Fig. 2.24 Frame number is changing on Clone Tab Courtesy-Author

Step 3. Now we will find out most appropriate frame to paint. As shown in Figure 2.25 frame 47 is a blank frame which is most suitable because it has all the background details. So we will clone from frame 47.

Fig. 2.25 Blank Frame Courtesy-Author

Step 4. Now navigate first frame on viewer screen as shown in Figure 2.26 (a) and fill frame number 47 in clone tabs as shown Figure 2.26 (a).

Fig. 2.26 (a) Viewer's first frame

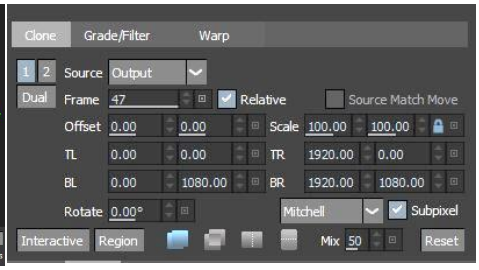


Fig. 2.26 (b) Clone Source

Step 5. Observe both frames in a single one by using clone viewing option, which is onion skin, align, vertical split and horizontal split as shown in Figure 2.22 (a), (b), (c) and (d).

Step 6. We will prefer vertical split because it helps to align the clone and source frame. Now select **Vertical split** as shown in Figure 2.27 and transform the clone source according to source frame.

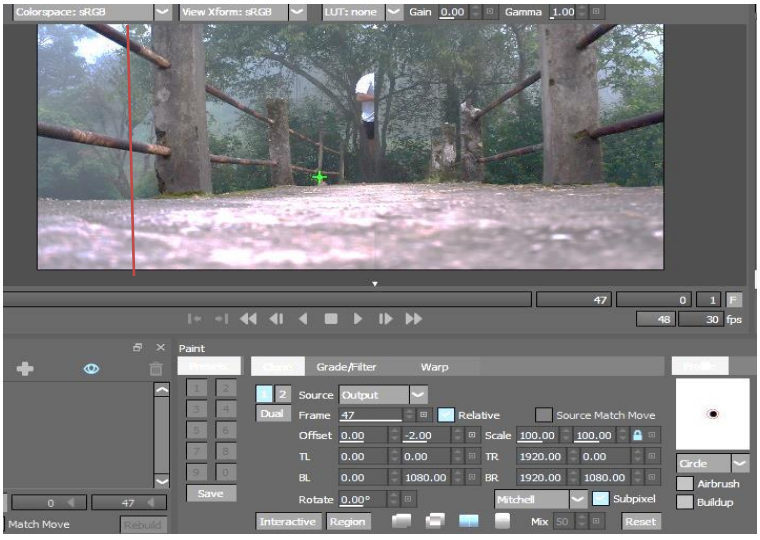


Fig. 2.27 Vertical Split Courtesy-Author

Step 7. Now select clone tool from tool panel. Resize the brush by bracket [and] key as shown in Figure 2.28.

Fig. 2.28 Clone Tool Courtesy-Author

Step 8. You can also use **Caps-lock** key to switch between target frame and vertical split as shown in Figure 2.29 (a) & (b).

Fig. 2.29 (a) Caps-lock on **Fig. 2.29 (b) Caps-lock off**

Step 9. Now select clone tool, resize the brush either from profile tab or just pressing the bracket key and start painting the frame as shown in Figure 2.30.

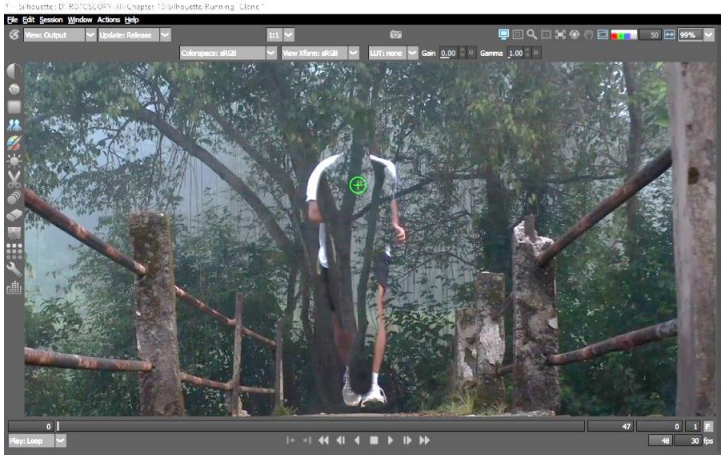


Fig. 2.30 Start Painting the frame by Clone tool Courtesy-Author

Step 2. Take extra care while you are painting the corner of the object. After finishing the painting, the object will be disappeared from the frame as shown in Figure 2.31.

Fig. 2.31 Object is disappeared from the Target frame Courtesy-Author

Step 11. In this way, you can remove the object from every frame. Let us take another frame such as frame number 25 and observe it in vertical split. Remember that your clone frame is still frame number 47. So, in vertical split it will show frame number 25 as a target frame and frame number 47, as a clone frame as shown in Figure 2.32.

Fig. 2.32 Target and Clone Frame Courtesy-Author

Step 12. Utilize step 9 and 10 to clean the target frame as shown in Figure 2.33.

Fig. 2.33 Clean frame Courtesy-Author

Step 13. You can easily remove any obstacle from frames, by using these steps.

2.5.5 Grade/ Filter Tab – It contains colour correction controls while the filter tab is used for blur and sharpening. It does not correct colour on target frame but colour correct the clone frame. So, keep in mind, that it is useful for matching the colour of clone frame with target frame as shown in Figure 2.34.

Fig. 2.34 Grade/Filter Tab Courtesy-Author

Let us demonstrate it with activity.

1. Take target and clone frame in vertical split as performed earlier as shown in Figure 2.35 (a & (b).

Fig. 2.35 (a) Vertical split , Courtesy-Author

Fig. 2.35 (b) Grade/ Filter default value Courtesy-Author

2. Now, slide the value of gain and gamma. Observe its impact on clone frame as shown in Figure 2.36 and Figure 2.37.

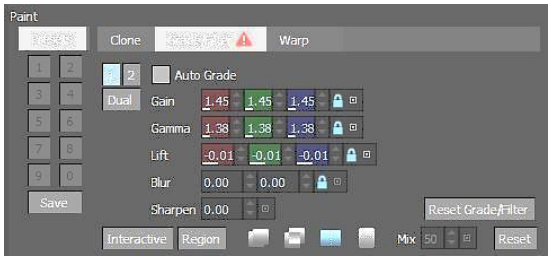


Fig. 2.36 Grade/Filter custom value Courtesy-Author

Fig. 2.37 Colour grade control impact on clone frame Courtesy-Author

Now you can understand that value of grade and filters only impact on clone frame. It is mostly used to match both frames.

2.5.6 Warp tab – The Warp tab in the Clone Brush allows you to warp specific image areas using pins, while leaving other areas untouched. Adjustments can range from subtle nip and tucks to something more obvious like repositioning an arm or leg.

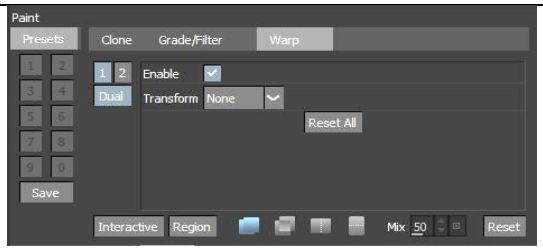


Fig. 2.38 Warp Tab Courtesy-Author

Practical Activity 2.3 – Create Clean Plate from video and utilize it for removing the wire.

You may not always get a blank frame in video. So, create it by using some other frame of the video, which is called clean plate. A clean plate is a kind of blank frame which is work as a background when you are going to remove an obstacle from the frame.

So, let us understand the process of creating clean plate from the video frame and utilize this frame to remove the obstacle. Keep in mind that this clean plate works only when the video is not moving.

Step1. Watch the video again and again, before starting to work on video. Identify the object to remove from frame. In this video you need to remove the object showing in red arrow in Figure 2.39

Fig. 2.39 Identify the object which needs to remove in target frame Courtesy-Author

Step 2. Import the video frames in SilhouetteFX©. Create new session on **trees window**. Insert paint node as shown in Figure 2.40. Now, all set for creating clean plate.

Fig. 2.40 Insert Paint Node Courtesy-Author

Step 3. Identify the target and clone frame for creating clean plate. After playback it is observed that there is no frame which is clean and have no rope and wire. So you need to use clone tool and paint it manually.

Use these three steps.

- Select Clone Tool

1. Search nearest similar pixel, Press shift and drag toward target.
2. Drag the stroke over the target.

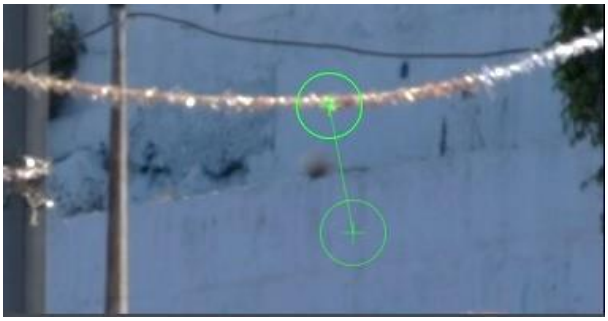


Fig. 2.41(a) Press shift and drag toward target

Fig.2.41(b) Drag the stroke over the target Courtesy-Author

Step 4. By using clone brush, you can remove all the obstacles from the frame. Observe the Figure 2.42, all the obstacles from the frame has removed.

Fig. 2.42 (a) Original frame

Fig.2.42 (b) After using clone brush

Step 5. Now this frame will work as a clean plate for rest of the video frame. So you need to export this single frame. To export the frame,

(a) Select Output node in trees window as shown in Figure 2.43.

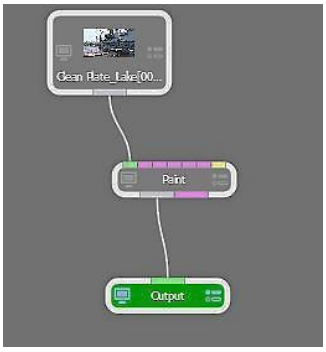


Fig. 2.43 Output Node Courtesy-Author

(b) Select output parameters like format and file location as shown in Figure 2.44.

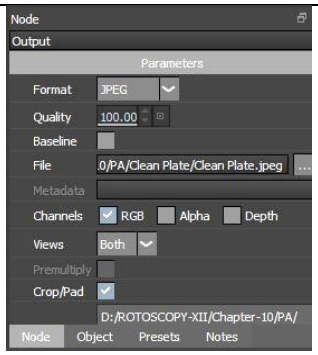


Fig. 2.44 Output Window Courtesy-Author

(c) Go to the **Session> Render Session.** Select the desired setting and click on render as shown in Figure 2.45. Your file will be saved on desired location.

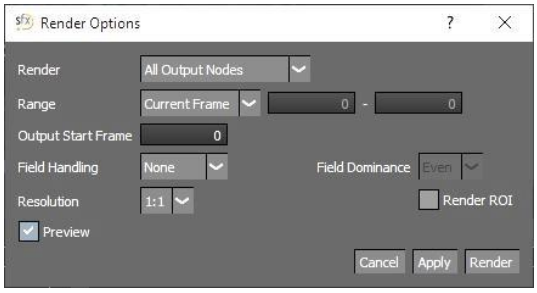


Fig.2.45 Render Options Courtesy-Author

Step 6. Now import clean plate in SilhouetteFX©v7.5 software as shown in Figure 2.46.

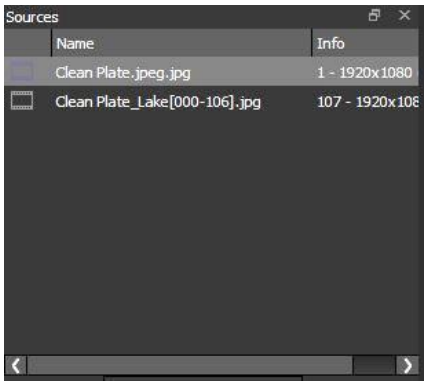


Fig. 2.46 Clean plate imported on software Courtesy-Author

Step 7. Insert clean plate on trees window and connect it with **input-1** in **Paint** node as shown in Figure 2.47.

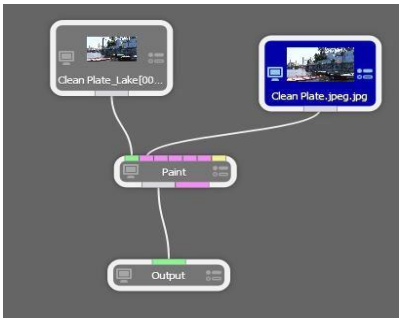


Fig. 2.47 Clean plate connected with input-1 in paint node

Step 8. Now move to Clone control, Focus on these settings, as shown in Figure 2.48.

(a) Source – Input 1 because we have connected clean plate with Input 1.

(b) Frame – 0 because clean plate has single frame. Its frame number is 0.

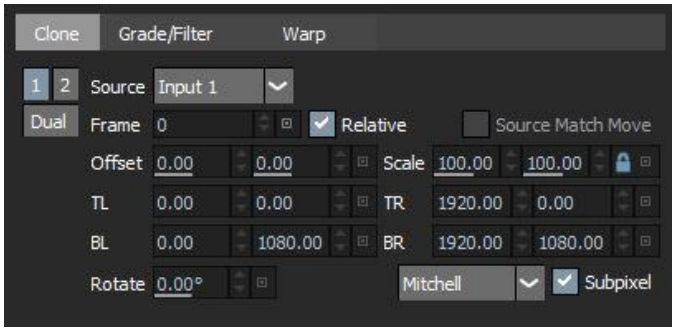


Fig. 2.48 Clone Control Settings

Step 9. You can switch between clean plate and target frame which is current frame in viewer by pressing **Caps Lock** key as shown in Figure 2.49.

Fig. 2.49 (a) Caps-lock off (onion skin mode)

Fig. 2.49 (b) Caps-lock on (Current Frame/ target frame) Courtesy-Author

Step 2. Move the selected clone brush over the object which has been cleaned on the clean plate and drag the brush over it as shown in Figure 2.50.

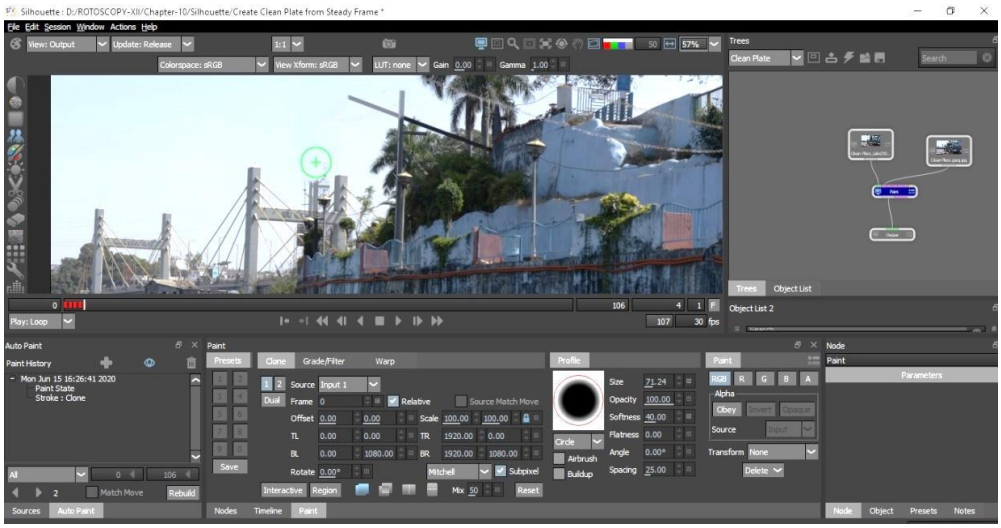


Fig. 2.50 Hold left mouse and drag the brush over the object which is removed in clean plate

Step11. After the completion, the frame is cleaned as shown in Figure 2.51.

Fig. 2.51 Frame; after the removing of obstacles Courtesy-Author

Step 12. Follow these steps to clean each frames. Remember to set source frames in clone control every time you will move forward and select new frame.

Assignment 2. Shoot a video and remove unwanted object like aeroplane, electric pole and many more from it.

Summary

Wire Removal and Rig Removal are the widely used technique in VFX, which requires massive rotoscoping.

If the object is not in motion, then creating Clean Plate is a faster way technique to paint.

In paint node, Clone tool is mostly used to remove wires.

Select the source frame in Clone tab; this will work as a reference frame to paint the other frames.

There are four clone viewing options- Onion Skin, Align, Vertical split and Horizontal split.

Use Caps-lock key to switch between clone and source frame.

CHECK YOUR PROGRESS

A. Multiple Choice Questions

1. Scene salvage does not cover (a) Scratch on the film (b) Flashing frames (c) Light leaks (d) Audio noise
2. Pre-planned post production process is (a) Wire removal (b) Hair in the gate (c) Dust busting (d) Lens flare
3. Wire removal technique is used in (a) Action sequences (b) Motion control shot (c) Animation (d) Stop motion
4. Clean plate is_____ (a) Frame with an object (b) Foreground object (c) Background object (d) Empty piece of frame of a scene.
5. Which node is required to remove wire/rig (a) Roto (b) Paint (c) Power matte (d) zMatte
6. Blemish brush combines (a) Blur and grain brush (b) Blur and Clone brush (c) Eraser and grain brush (d) Clone and grain brush

7. In paint tool, Clone brush (a) Blur the image (b) Paints the image using another part of the image or other image (c) Erase the image (d) Paint the image using selected colour
8. In paint tool, Eraser brush (a) Erase painted stroke (b) Erase the background object (c) Erase the painted stroke and revert the image (d) Erase the foreground object
9. In clone brush, clone tab deals with (a) Timing (b) Transformation (c) Timing and transformation (d) Position
10. Clone viewing option doesn't includes (a) Onion Skin (b) Align (c) Vertical split (d) Diagonal split

B. Fill in the blanks

1. In Visual effects shot, hero is trussed up with a_____.
2. We use_____ tool in wire removal by painting frame by frame.
3. Clean plate work well when camera is not_____ and shots are_____.
4. The Blemish brush is useful for removing _____.
5. Mosaic divides the picture in to the _____tiles.
6. Once you select paint tool, you can customize your brush setting in_____.
7. The tool which takes samples from the other parts of the image is called_____.
8. You can select the required frame in_____ under source control which work as a clone source.
9. Onion skin mixes clone sources and _____.
10. Grade tab contains _____.

C. True or False

1. Wire removal is performed in pre-production.
2. Cloning is much more effective, as it clones not just colour but grain or noise.
3. The size of the brush can be changed by pressing bracket key.
4. Align inverts the clone source and mixes it with the background.
5. You can use Caps lock key to switch between target frame and clone viewing options.

D. Short answer questions

1. What is scene salvage?
2. What is wire removal? When is this technique used?
3. How the wire removal can be performed?
4. What is clean plate? Explain various method of creating clean plate.
5. Write the use of clean plate in wire removal.
6. Write different brushes included in Paint tool.
7. Why clone tool is so important? Explain.
8. Write the control of clone brush tool.
9. Write different clone viewing options. When is it used?
10. How can we create clean plate from the video clip?

Session 3. Stereo Roto

Stereo is the same terminology commonly used as 3D with little difference. Film and video production team such as cinematographers, Visual effects artist, editors and colorist often use the term stereo, while if it is displayed in cinema theaters, television, then it is known as “3D” as shown in Figure 3.1 3D television view.

Fig. 3.1 3D television view

Today, entire movie process has been digitized, that made stereo production much easier and higher quality. No matter in which format you have filmed movie, you need to digitize it for further post production workflow. Because now editing, visual effects and even projection is also converted in digital platform. A digital production pipeline results in a much higher-quality movie than all-film process could ever be.

Even digitization of theatrical projection system is responsible for stereo movies production. The same projector that displays stereo can also display regular movies. No extra equipment to purchase. No dual prints to purchase for projection. Along with this goes much higher-quality stereo projection technology using polarized light and glasses instead of the old red and blue anaglyph glasses. In short, the digital process has made stereo movies practical, high quality, and reasonably economical.

3.1 Stereography

Let us understand this term. It is a technique of creating and projecting stereo movie. It is based on human visual system. In reality, the human capacity to perceive the depth of a scene in the real world is made up of many distinct visual signals, but the only reference used for a stereo film is "stereopsis," where a human watch a scene from two slightly different point of view.

View the "inter-pupillary" distance from two eyes. The distance between the pupils, spaced approximately 2.5 inches from each other, as shown in Figure 3.2.

Fig. 3.2 Two eyes views

Do you know, that both eyes produce two slightly different views of any scene, later brain “fuses” those images by matching the feature between them. Basically, this fusion creates stereo vision.

If the features don’t match, there will be no fusion. The offset or slightly difference between matched features is the depth cue to the brain. It uses these offsets to sort the

various surfaces in the scene into their relative depth positions so that you can get a stereo image.

Convergence of the eyes is also another perception in stereo viewing. It is the angle between the eyes line of sight as they lock onto a target. But the human eyes do more than converge on a target. They also focus on that same target. So the eyes create two separate responses to a 3D scene—convergence and focus, which work together when we look at a 3D object in the real world.

The 3D movie projector is always focused on the screen. As object change, depth in the scene the convergence shifts in and out of the screen, but the focus is locked at the screen plane. As a result, a 3D movie is an unnatural act to the brain because the convergence and focus are not locked together like in the real world. This is difficult for some people to do. So they get headaches or eyestrain. In fact, about 15% of the general population cannot do this trick at all so they cannot see the 3D in a 3D movie.

3.2 Convergence

When working with the stereo, you will hear many times about convergence. Convergence is the point in Z axis, where the eyes converge to meet at the same point, or intersect. The Figure 3.3 demonstrates how the point of convergence determines the parallax by drawing the red and blue lines of the left and right lines of sight. In the positive parallax positions, the depth of the object will be behind the screen, while in negative parallax, the depth will be in front of the screen, while there is no depth in zero parallax position.

Fig. 3.3 Convergence and parallax

The zero parallax is very important because it defines the screen plane. When looking at an anaglyph image any objects that have no red/blue ghost outline are at zero parallax as shown in Figure 3.4 and are on the screen plane.

Fig. 3.4 Anaglyph view of 3D object

Shifting the parallax of an object will move that object in and out of the screen. This becomes very important for stereo compositing and stereo conversion as we often need to adjust the parallax of the various objects in the frame to create a good stereo experience for the audience. You must have heard the terms “setting the convergence” or making an object “the point of convergence.” This really means to set the object on the screen plane with zero parallax.

3.3 Viewing Stereo

Once you have the left and right eye views, the next challenge is to project the correct view to each eye in such a way that the other eye does not see it. One of the oldest, cheapest, and poorest-quality methods is “anaglyph”—the old red and blue (cyan, really)

glasses, as shown in Figure 3.5. If you have a pair of anaglyph glasses, it would be a good time to get them out and try them on the stereo image. Anaglyph suffers from a number of deficiencies. Color purity and brightness are reduced, and with high contrast images there will be "ghosting" where one eye's view "leaks" into the other eye.

Fig. 3.5 Anaglyph glasses

When you watch a 3D movie in theater, the technology is polarized light and glasses, Which is known as "passive "glasses, since they are not required any electronics. It is inexpensive, but the quality is much better than anaglyph glasses. These glasses also have drawback of reduce brightness, due to polarize filter. For a workstation, "active" glasses are used. These glasses have LCD shutters synced to the monitor. Since active glasses are electronic accessories, they are expensive, costing well over 100$ per pair.

Fig. 3.6 (a) & (b) Active and passive 3D glass

3.4 Stereo Conversion

In this process, we convert 2D movie in stereo 3D film by using difficult post-production workflow. In stereo conversion, massive amount of roto work required. For this reason, most stereo conversion is being done largely in India. Even if the stereo conversion is performed in the USA, its roto work is done mostly out of the country.

Many stereo 3D movies are actually produced using the "checkerboard" method where some scenes are shot in stereo and others are converted to stereo in post-production. Each approach, shooting in stereo and converting to stereo, has its advantages and drawbacks. So the decision is made scene by scene as to which method to use and they are inter-cut in the final movie. The big advantage of stereo conversion is that, it is possible to set the stereo depth and convergence of each shot for best artistic results since its stereo is being constructed from scratch.

Doing a stereo conversion on a feature film is a non-trivial project, and not just from the labor standpoint. There are definite technical issues to address as well as a variety of artistic issues to get right. In this section we will take a close look at the entire stereo conversion process.

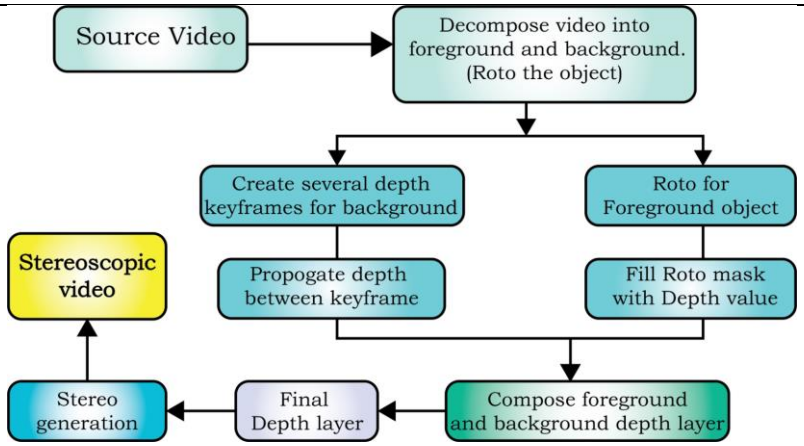


Fig. 3.7 Stereo workflow Courtesy-Author

In the workflow given in Figure 3.7, you can observe that stereo conversion process can be divided in three major steps.

- Stereo roto – where we separate the foreground and background.
- Depth map creation – In this steps, we create displacement map, by using roto shapes.
- Stereo conversion – Here, we convert 2D object in 3D by using displacement map.

Know More...

Displacement Map – It uses black and white color to represent distance/depth in an image. Anything that is close to the camera will be represented by white and thing which is in distance from the camera is represented by black. (Figure 3.8 (a) & (b).

Fig. 3.8 (a) Original image Courtesy-medium.com

Fig. 3.8 (b) Displacement map

So first, we will try to use this stereo conversion technique in a still image, which help us to understand the process of stereo conversion. For this complete process two software are used namely **Adobe Photoshop**© for creating displacement map and **Adobe after Effects**© to utilize displacement map for stereo conversion.

Let us demonstrate it in the Practical Activity 3.1.

Practical Activity 3.1 – Create displacement map for an image.

Step 1. Import image in the software Adobe Photoshop CC 2019.

Step 2. Create a new layer and fill it from black. Keep the black opacity 50% as shown in Figure 3.9.

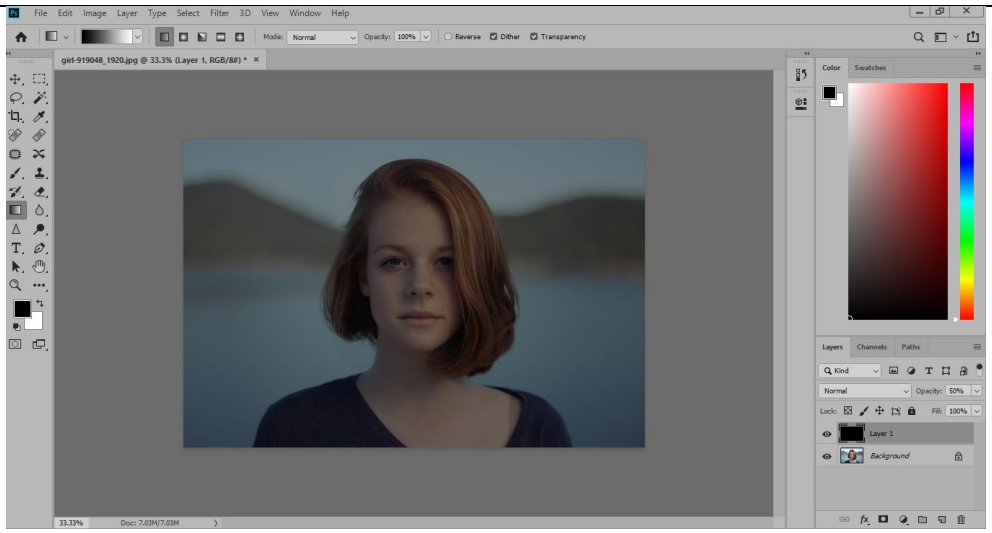


Fig. 3.9 Create new layer and fill it with black Courtesy-Author

Step 3. Select brush tool from toolbar and keep opacity of the brush around 20% as shown in Figure 3.10.

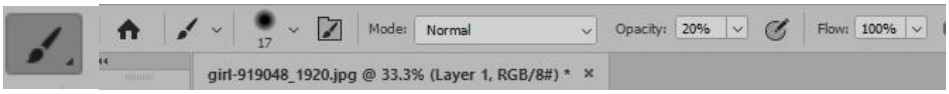


Fig. 3.10 brush tool and its toolbar Courtesy-Author

Step 4. You can adjust the size of the brush by right clicking on canvas. The control of the brush is shown in to Figure 3.11.

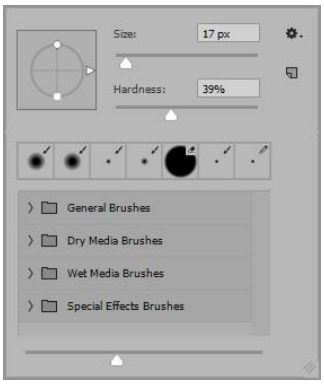


Fig. 3.11 Brush control Courtesy-Author

Step 5. Select the white colour in foreground and paint it over the girl as shown in Figure 3.12.

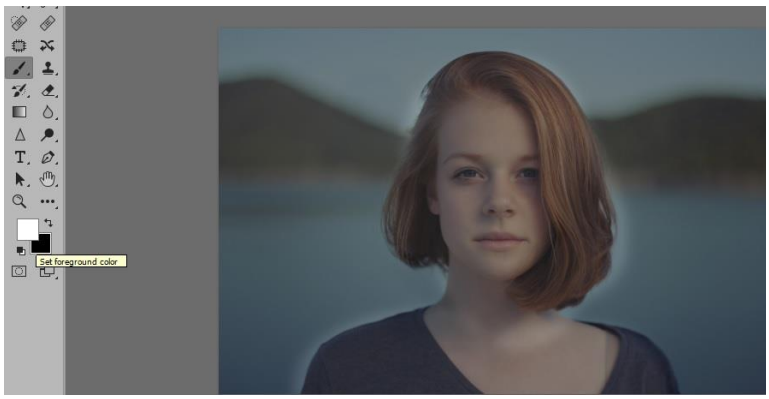


Fig. 3.12 Paint white colour over object Courtesy-Author

Step 6. Use the brush again in front hair, so that it can become whiter than others. Increase the opacity of black layer to see the progress in depth map as shown in Figure 3.13.

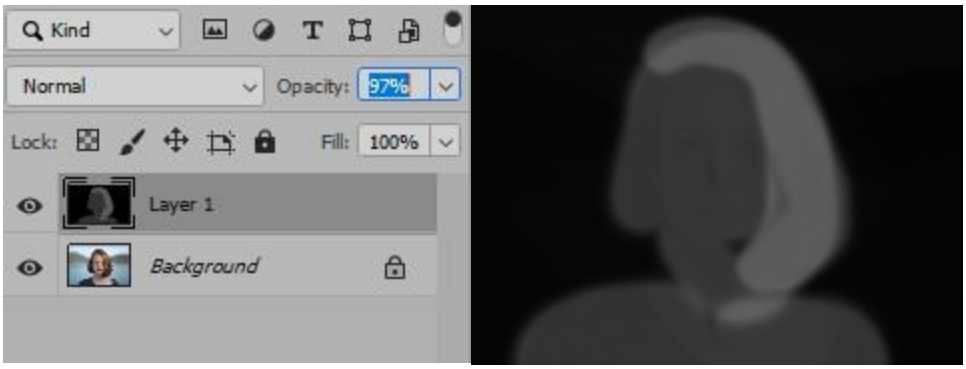


Fig. 3.13 (a) & (b) Impact of brush on layer Courtesy-Author

Step 7. Now decrease the size of the brush by right clicking on it, and use the brush again over nose, eyes, lips and eyebrow as shown in Figure 3.14.

Fig. 3.14 Use the brush again over nose, eyes, lips and eyebrow Courtesy-Author

Step 8. Now, finally use the brush again over nose then keep layer opacity 100% and observe displacement map as shown in Figure 3.15.

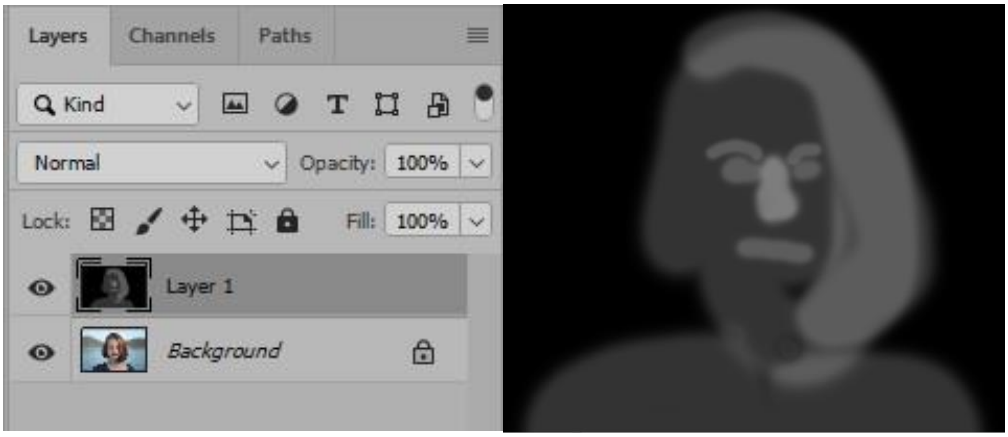


Fig. 3.15 (a) & (b) Use the brush over nose Courtesy-Author

Step 9. Save the file in .PNG format in Photoshop.

This in this Practical Activity 3.1, we have created displacement map with the help of Adobe Photoshop. Now, we will use it, to create stereo image in Adobe after Effect in the Practical Activity 3.2.

Practical Activity 3.2 – Utilize displacement map for creating stereo image in Adobe after Effects.

Step 1. Open Adobe After Effects software and import both image and displacement image as shown in Figure 3.16.

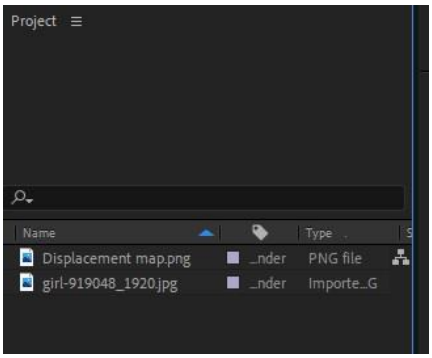


Fig. 3.16 Import the images into After Effects Courtesy-Author

Step 2. Right click on displaced image and create new composition from selection as shown in Figure 3.17.

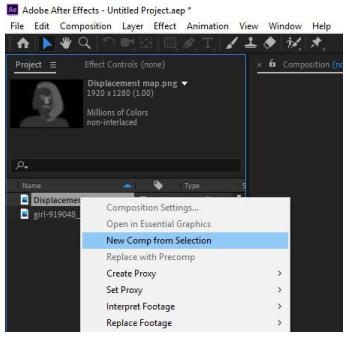


Fig. 3.17 Pre-compose the selected image Courtesy-Author

Step 3. Now, displacement Comp is created as shown in Figure 3.18.

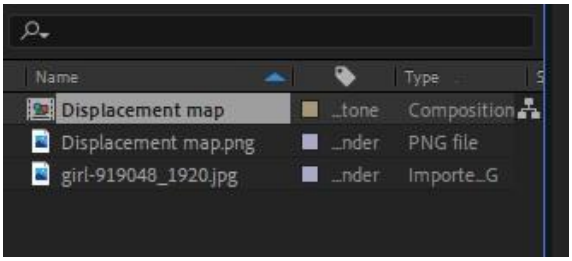


Fig. 3.18 Comp is created Courtesy-Author

Step 4. Repeat the steps, to create girl image comp as shown in Figure 3.19.

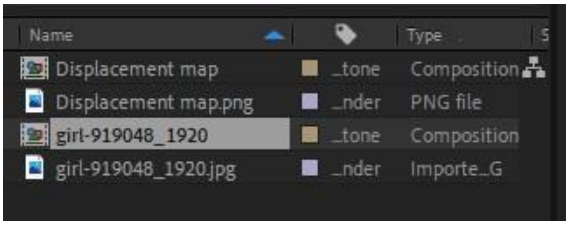


Fig. 3.19 Girl image comp Courtesy-Author

Step 5. Now, insert **displacement map** comp above girl image in timeline and disable displacement map, as shown in the Figure 3.20.

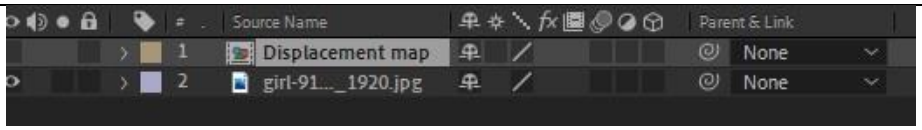


Fig. 3.20 Insert displacement comp over girl image in timeline Courtesy-Author

Step 6. Search displacement map in effect and preset window as shown in Figure 3.21.

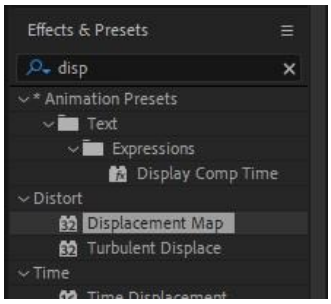


Fig. 3.21 Search displacement map filter Courtesy-Author

Step 7. Apply it over the girl image, as shown in Figure 3.22.

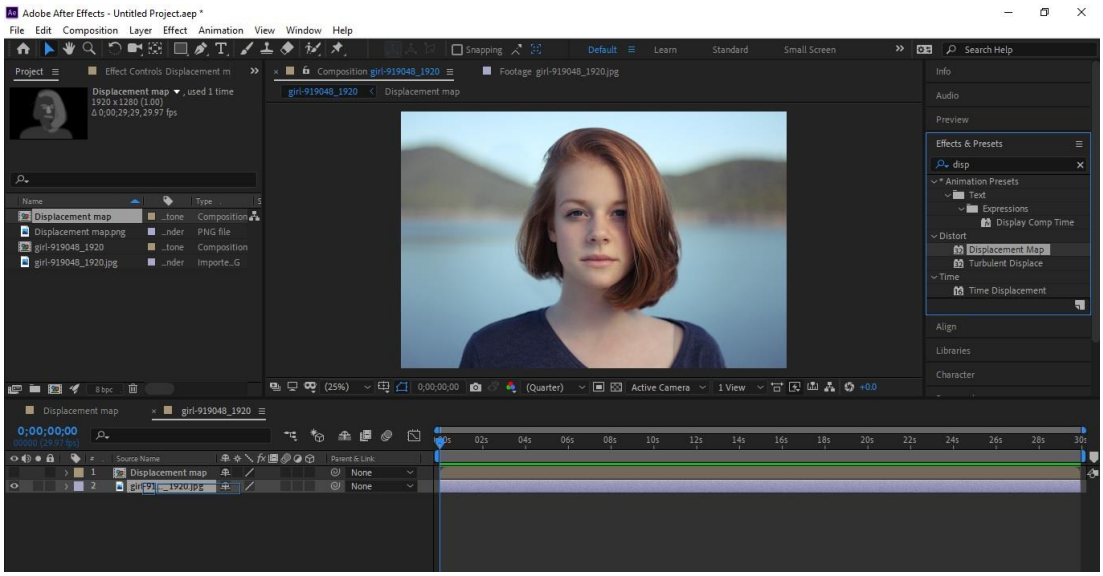


Fig. 3.22 Apply the filter in girl image Courtesy-Author

Step 8. In effect control window, select displacement map image as a displacement layer as shown in Figure 3.23.

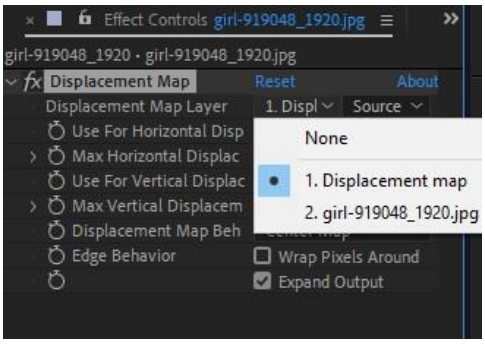


Fig. 3.23 Select displacement layer Courtesy-Author

Step 9. Keep the rest of the setting, as shown in Figure 3.24.

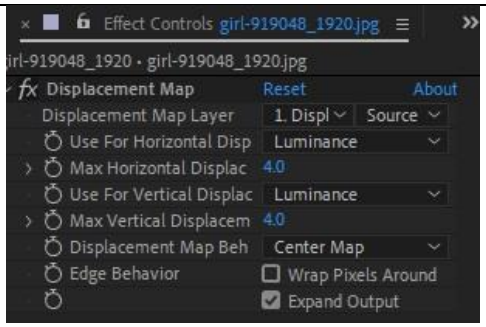


Fig. 3.24 Displacement map setting Courtesy-Author

Step 10. Now change the setting of horizontal and vertical displacement and observe this image in stereo more easily.

So, now you have some idea about stereo conversion. But, you might be thinking about the use of roto in stereoscopic conversion process, because it is mentioned earlier but not used yet, in stereo image conversion. So let's discuss about the first step of stereo conversion.

3.5 Stereo Roto

Basically it is the rotoscoping technique. However here you require rotoscoping in detail as shown in Figure 3.25 for instance. If you are rotoscoping any human face then during rotoscoping, your focus will be on outside edges of the face like ears, chin, neck. But in case of stereo roto, you need to isolate each part of the face separately like eyes, eyebrows, lips, ears, chins, hairs, neck and many more.

A depth isolation of different part is required to send these shape to stereo conversion department, who create z-depth or we can say displacement map from this stereo roto. and later displacement map is used in stereo conversion.

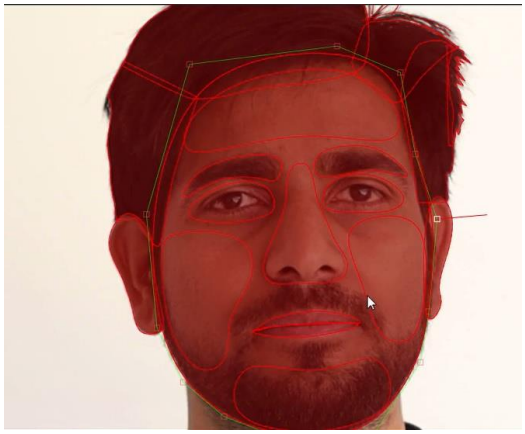


Fig. 3.25 Stereo Roto of the face Courtesy-Author

Practical Activity 3.3 – Create stereo roto of the person.

Step 1. Create a project in SilhouetteFX©v7.5, import image sequence. Creates session and insert roto node between source and output as shown in Figure 3.26.

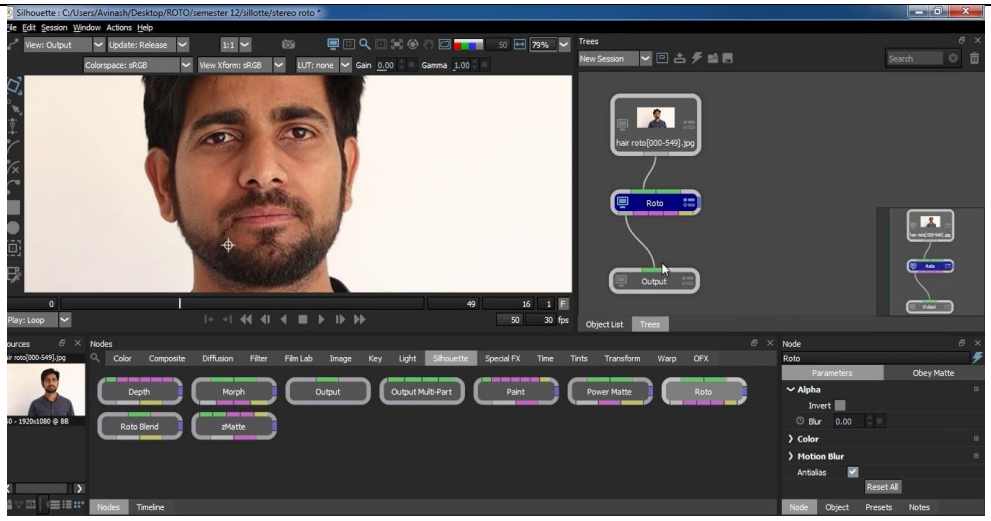


Fig. 3.26 Create a session Courtesy-Author

Step 2. Now playback the image sequence and evaluate the depth into face as shown in Figure 3.27, like nose is situated in front while eye is slightly in depth than cheek. In this way, you can separate different object into the face.

Fig. 3.27 Evaluate the depth in a face Courtesy-Author

Step 3. First, we will roto the nose by using Bezier spline tool as shown in Figure 3.28.

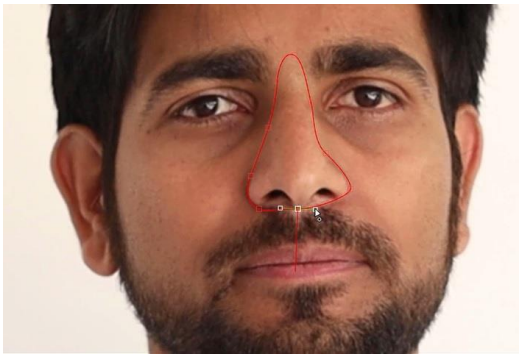


Fig. 3.28 Roto the nose by using Bezier tool Courtesy-Author

Step 4. Rename the object whenever you create any shape as shown in Figure 3.29. It helps the stereo conversion team to find out the object easily.

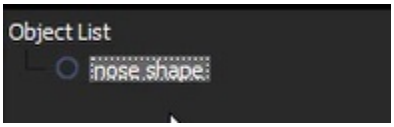


Fig. 3.29 Rename the shape Courtesy-Author

Step 5. After creating the shape, you can use tracker to follow the object path. This time, we will select planar tracker, as shown in Figure 3.30.

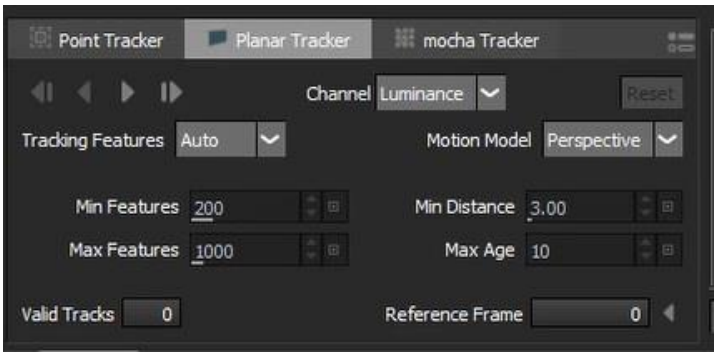


Fig. 3.30 Use planar tracker Courtesy-Author

Step 6. Click on tracker icon shown in Figure 3.31 in roto tool panel.

Fig. 3.31 Tracker icon

Step 7. Tracker will applicable over any layer. So first create a layer and keep the shape into it.

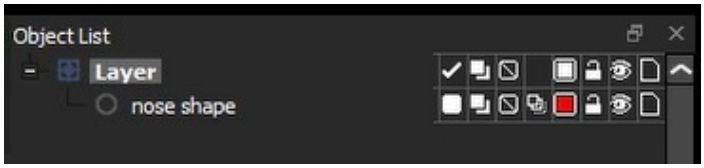


Fig. 3.32 Create a new layer and put the shape into it Courtesy-Author

Step 8. Once the layer is selected, click on tracking option into planer tracker tab as shown in Figure 3.33.

Fig. 3.33 Apply planar tracker over selected layer Courtesy-Author

Step 9. If tracker is not up to mark, then you can also use manual tracking option, as shown in Figure 3.34.

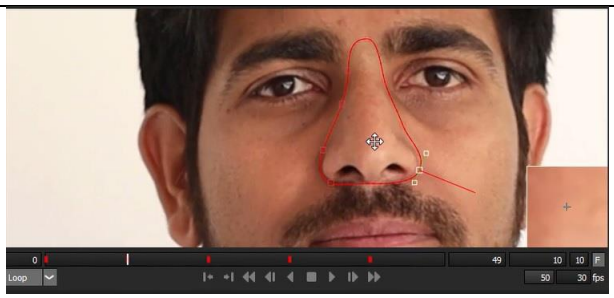


Fig. 3.34 Manual tracking Courtesy-Author

Step 10. After rotoscoping nose, create shape for lips as shown in Figure 3.35.

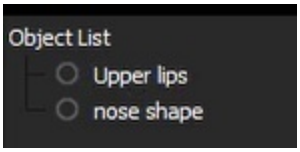


Fig. 3.35 (a) & (b) Create upper lips shape Courtesy-Author

Step 3. Now, both eyes are rotoscoped by using Bezier tool as shown in Figure 3.36.

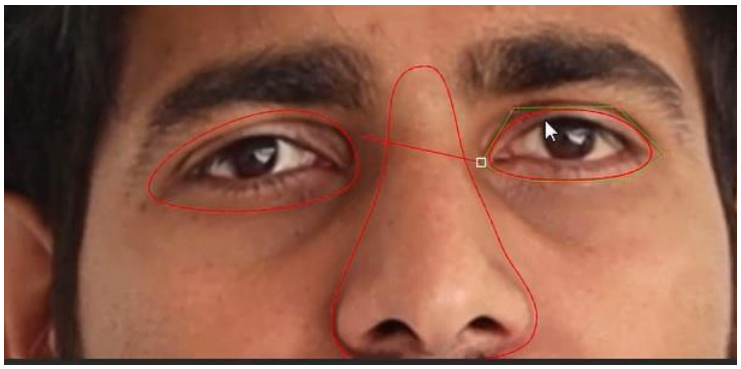


Fig. 3.36 Rotoscoping eyes Courtesy-Author

Step 12. Always check the object list and manage it as shown in Figure 3.37. Keep the shape under same group.

Fig. 3.37 Manage object list Courtesy-Author

Step 13. For tracking right eye, select mocha tracker as shown in Figure 3.38. It gives more accurate tracking than other tracker.

Fig. 3.38 Use mocha tracker for right eye tracking Courtesy-Author

Step 14. By using Bezier tool, the shape of eyes, eyebrows, cheek, lips are formed as shown in Figure 3.39.

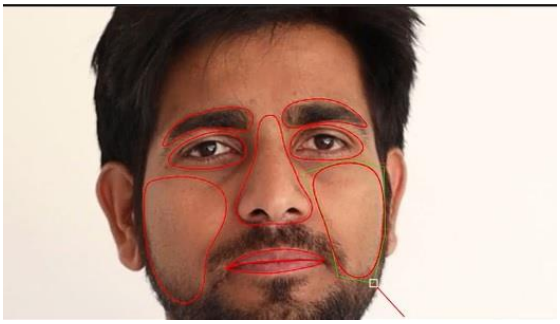


Fig. 3.39 Different shapes of face are isolated Courtesy-Author

Step 15. Keep the shape under familiar group as shown in Figure 3.40.

Fig. 3.40 Keep the shape in familiar group Courtesy-Author

Step 16. Once the major shapes have been created, you need to create base shape around the face as shown in Figure 3.41. It will cover the blank spaces of all shapes.

Fig. 3.41 Create base shape around the face Courtesy-Author

Step 17. Now, watch the complete view of face as shown in Figure 3.42.

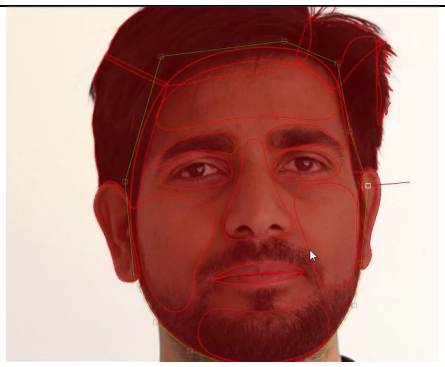


Fig. 3.42 Complete view of the face Courtesy-Author

Step 18. Following the above steps completed the stereo roto of the person as shown in Figure 3.43.

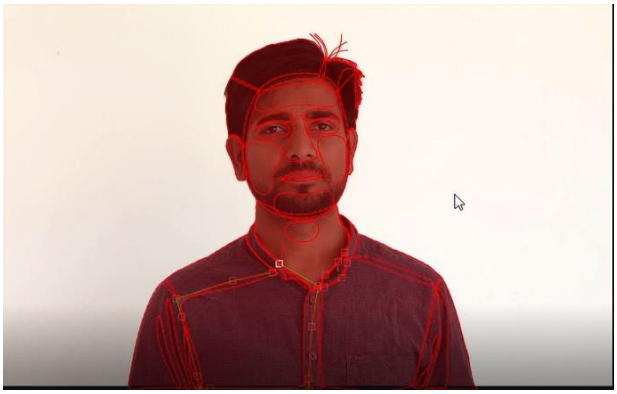


Fig. 3.43 Stereo roto of the person Courtesy-Author

Step19. Press A in keyboard for alpha view as shown in Figure 3.44.

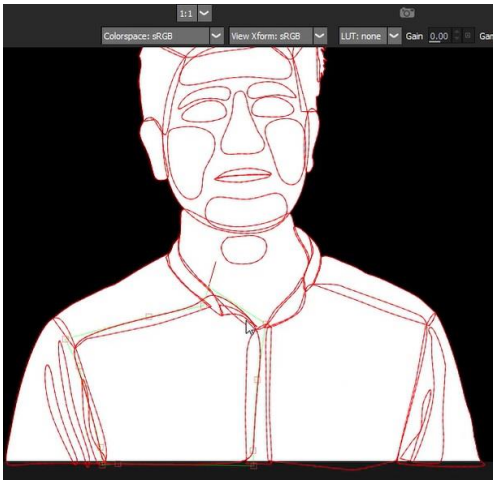


Fig. 3.44 Alpha view Courtesy-Author

Step 20. Arrange the all layer and shapes carefully, as shown in Figure 3.45.

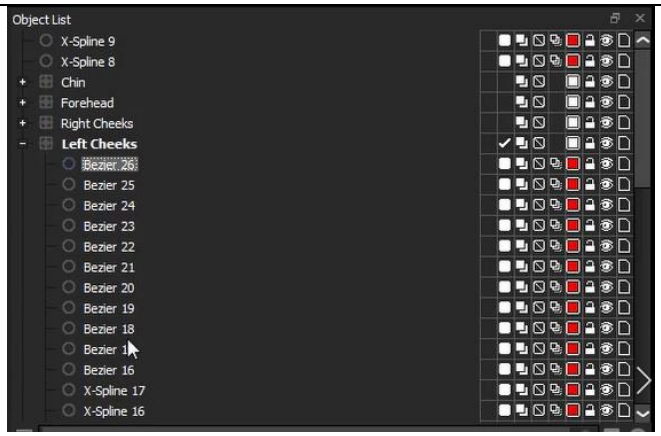


Fig. 3.45 Manage different shapes in object list Courtesy-Author

After stereo roto, you need to send these shapes to stereo conversion department, which creates depth map/displacement map by using these shapes into Nuke, After Effects software. Displacement map is a similar process which is used in Adobe Photoshop for image 3D conversion.

3.6 Key to good stereo conversion

- A strong working relationship with the overall supervisors.
- A strong relationship with the vendors, so that relevant files such as keys and mattes can be provided.
- Pre-production planning is much important in visual effects work. So, it is better to involve stereo conversion company during this phase.
- Time is another factor with stereo conversion because here is huge volume of work, ensuring the schedule allows time for roto.
- Some other aspects of film making also affect conversion such as speed of camera movement, framing and staging. If you can identify the main stereo moments in the script and shoot in this way that, how they will be converted in stereo, then you can create impact on final conversion.
- Finally, try to make a good film in stereo not a good stereo film.

Summary

Stereography is a technique of creating and projecting 3D movie.

Convergence and focus work together to provide your eyes the feel of 3D object in the real world.

In the positive parallax, the depth of the object will be behind, while in negative parallax depth will be in front of the screen and you will not see any depth in zero parallax.

Three types of glasses are used for 3D viewing, - Anaglyph glasses, passive glasses and active glasses.

In Stereo conversion, 2D movies are converted into 3D movies in postproduction.

Stereo Roto is a rotoscoping technique, where you need to roto each part of human figure separately such as eyes, eyebrows, lips, ears etc.

CHECK YOUR PROGRESS

A. Multiple Choice Questions

1. The term stereo commonly known as (a) 2D (b) 2.5D (c) 3D (d) 7D
2. The term stereo is not used by (a) Cinematographer (b) Video editor (c) VFX artist (d) Audience
3. The inter-pupillary distance between two eyes is (a) 1.5 inch (b) 2 inch (c) 2.5 inch (d) 3 inch
4. Eye creates these responses in 3D scene (a) Convergence (b) Focus (c) Convergence and Focus (d) Motion blur
5. In the positive parallax position, the depth of the object will be (a) in front of the scene (b) behind the scene (c) on the screen plane (d) Corner of the scene
6. When looking at an anaglyph image any objects that have no red/blue ghost outline are (a) zero parallax (b) Positive parallax (c) negative parallax (d) Null parallax
7. In checker board method (a) Movies picturise in 2D and later converted in stereo (b) Some parts of the movie is picturise in 3D while some is converted in stereo in post-production (c) Complete movie is shooted in 3D (d) Some part of movie is included animation
8. Which steps, is not included in stereo conversion (a) Stereo roto (b) Stereo audio conversion (c) Colour grading (d) Colour correction

B. Fill in the blanks

1. Today, entire movie process has been _____.
2. Digital process has made stereo movies practical, _____and reasonably____.
3. Stereography is based on _____.
4. Both eyes produce two _____ view of the scene.
5. Displacement Map uses black and white color to represent ____in an image.
6. Passive glasses are widely used in_____.

C. True or False

1. A digital production pipeline results in a much higher-quality movie than an all-film process could ever be.
2. Different digital projector is needed in cinema theatre, to watch 3D movie.
3. Stereopsis is the reference, which is used for a stereo film from human visual system.
4. In negative parallax, the depth will be inside of the screen.
5. Displacement map can be created after stereo conversion.

D. Short answer questioins

1. Write the difference between 3D and stereo?
2. What is stereography?
3. What is stereopsis?
4. Explain Positive, negative and zero parallex.
5. How can you view stereo movie?

6. What is stereo conversion?
7. Write major steps of stereo conversion.
8. What is displacement map? How can it be created?
9. What is stereo roto? Explain its utilization in stereo conversion.
10. Write key points for good stereo conversion.

Module 4. Finalizing Matte

Module Overview

In this module, we will discuss about some amazing tools which are used in the finishing stage of creating mattes. For instance, you are animating a roto shape and suddenly you need little adjustment in the shape and all key-frames. Here you can use Multi-frame tool, which helps to adjust shape in multiple key-frames.

During human rotoscoping, you are handling lot of shapes. However, at once few shapes are in used while others are just increasing the numbers. At that moment, every time you drag this unused shape out from the screen. Here opacity controls allow you to disable these unused shapes to keep their opacity zero.

Further in this unit, you will understand the techniques of rendering and exporting shapes. We will also focus on, exporting/importing mattes between compositing software like Adobe After Effects and editing software Adobe Premiere.

It is important to understand the synchronisation between various departments before beginning a career as a roto-artist. At the end, we will discuss about various departments like CGI, VFX, SFX and FX with their interconnections. We will also compare between most popular software used by these departments.

Learning Outcomes

After completing this module, you will be able to:

- Describe the learn the final steps and best practices for completing and refining rotoscoping work.
- Understand how to render and export shapes from rotoscoping projects for use in various applications.
- Familiarize yourself with setting up an efficient and organized work environment for rotoscoping tasks.

Module Structure

Session 1: Finishing the Rotoscoping

Session 2: Rendering and Exporting Shapes

Session 3. Rotoscoping Work Environment

Session 1. Finishing the Rotoscoping

Rotoscoping technique allows VFX artist to correct the things in post-production. Although it is time consuming, but its result is really amazing. It is the same techniques which are used by the Fleischer and Disney studios. Here you find some amazing tools in digital rotoscoping that helps to accelerate your work. We are discussing about the finishing the rotoscoping. In this chapter, you will understand the techniques like multi-frame, extracting the tracking data from the shapes and opacity control in the timeline.

1.1 Create a shape and track it

Although you have learned it in previous chapters, it is a kind of link, which will help you to reveal a magical 'multi-frame' tool.

Practical Activity 1.1 – Import a video clip into the SilhouetteFX© software and animate it by point tracker.

Step 1. Insert the roto node between source and output, as shown in Figure 1.1.

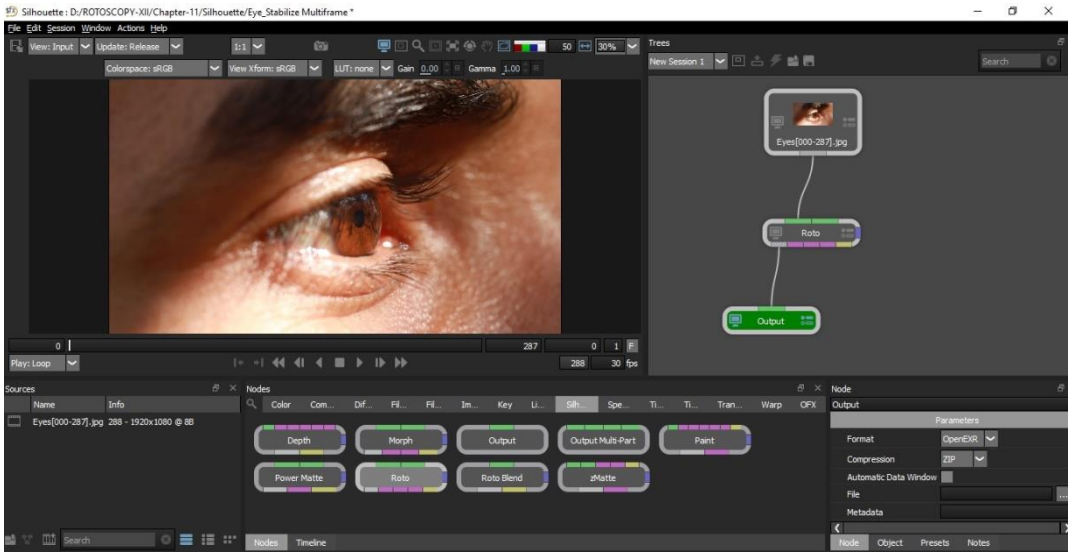
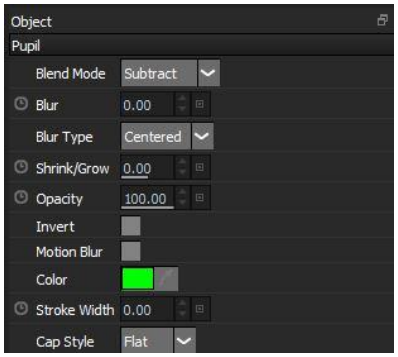


Fig. 1.1 Insert roto node Courtesy-Author

Step 2. Create two shapes for iris and pupil by using circle shape, as shown in Figure 1.2 (a).

Fig. 1.2 (a) Shapes of Iris and Pupil **Fig. 1.2 (b) Object list**

Step 3. Select pupil in **object list**, its controls will be shown on object window (Figure 1.3 (a)). In this window, choose subtract in blend mode. It will remove the inner circle from selection.



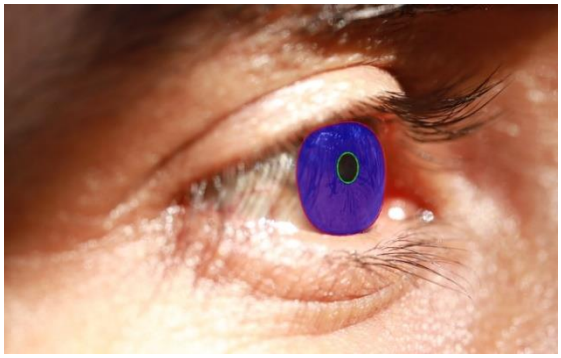


Fig. 1.3 (a) Object window **Fig. 1.3 (b) Overlay View**

Step 4. Now animate the shapes created according the eye movement. For this you need **tracker**. Before start tracking, create a layer and put these shapes on it, because trackers work on layer.

Fig. 1.4 Layer is created Courtesy-Author

Step 5. Use the tracker tool **point tracker** as shown in Figure 1.5 in roto node to create motion path of video.

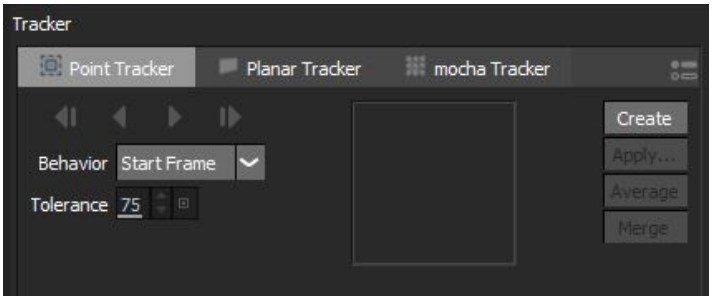


Fig. 1.5 Point Tracker tab Courtesy-Author

Step 6. Select the frame on **viewer** and click on **create** button on point tracker tab. A tracker will be appeared on viewer and object list as shown in Figure 1.6.

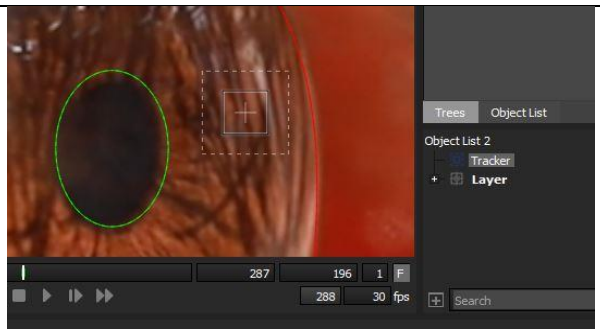


Fig. 1.6 tracker Courtesy-Author

Step 7. You need to place the tracker on the spot which has highest contrast. Use the **pre-processing controls** to find that spot. Make sure that preview is **on** in **pre-processing tab.**

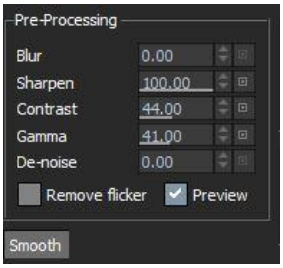


Fig. 1.7 (a) Pre-processing Controls

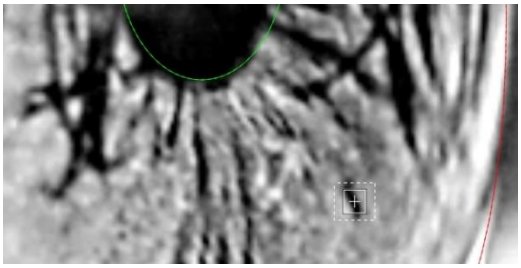


Fig. 1.7 (b) Effect of Pre-processing on viewer

Step 8. You have got tracking spot. Now you can disable preview in pre-processing window and start backward/forward tracking by pressing controls on **point tracking** tab as shown in Figure 1.8.

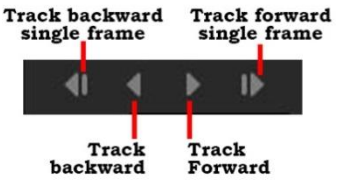


Fig. 1.8 Tracking controls

Step 9. You can watch the tracking path in the Figure 1.9.

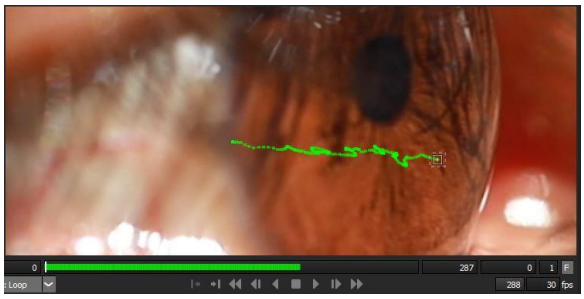


Fig. 1.9 Tracking Path Courtesy-Author

Step 10. Go to the first point on timeline, from where tracker started then click on **Apply** button on point tracker. A **match move** dialog box opens. Select your priorities and click on **OK** button.

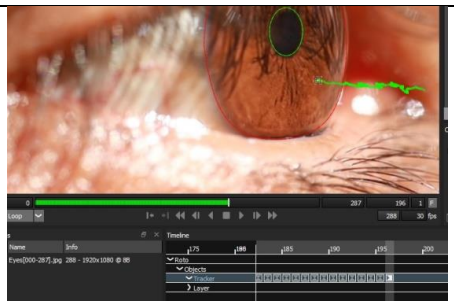


Fig. 1.10 (a) Frame in which tracking started Courtesy-Author

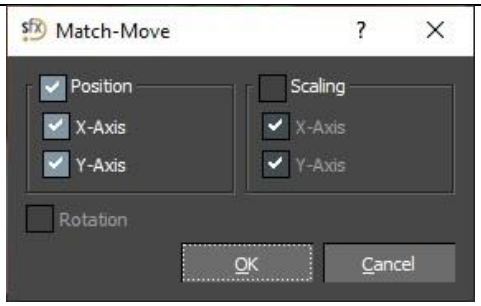
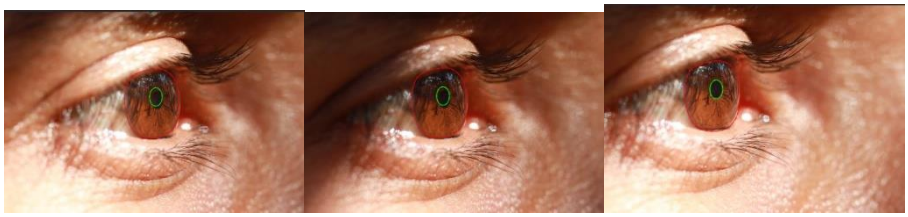


Fig. 1.10 (b) Match move dialog box

Step 11. Now tracker is applied on the layer. You can check shape movement by playback video on **viewer**.

1st Frame 10th Frame 20th Frame



50st Frame 100th Frame 210th Frame

Fig. 1.11 Shape movement in different frames Courtesy-Author

Step 1. In above pictures, shapes are in red and green outline. Observe that shapes are not changing place from 1st to 210th frame. This is because of tracker.

Step 13. You can adjust shapes by changing it at any points. It will create key frames.

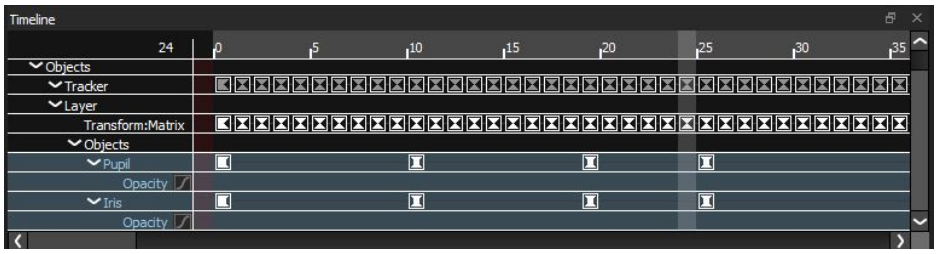


Fig. 1.12 Key-frame is created while adjusting shapes Courtesy-Author

Now you have animated shapes. You can observe that there is a need of adjustment on pupil's shape. We are also forgetting to give some feather in the corner. Here you can utilize **multi-frame** tool.

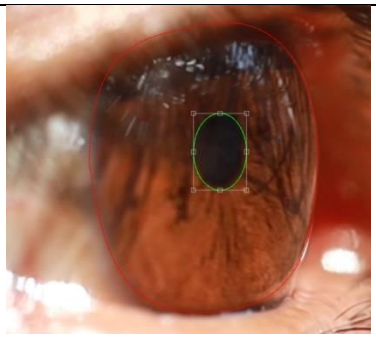


Fig. 1.13 different shapes Courtesy-Author

1.2 Multi-frame tool

Suppose you have created shapes for an object to perform rotoscoping. You have transformed it in halfway. Suddenly you feel that you need some adjustment in basic shapes. What you will do now? To adjust the shape on every key frame will take lot of time. Here you can use Multi frame.

Normally, adjusting a shape or points on a shape creates key frame only on that particular frame. When Multi Frame is activated, it modifies the Transform and Reshape tools to make adjustments across all previously set key frames or a selection of key frames. A red outline is drawn around the Viewer to know that Multi-frame is active.

Fig. 1.14 Multi-frame Tool Courtesy-Author

Fig. 1.15 Multi-frame range bar Courtesy-Author

To use Multi-Frame, select it from the Toolbar. Then, drag the red ends of the Multi-Frame range bar at the top of the Timeline to limit the key frames affected by Multi-Frame.

Practical Activity 2 – Adjusts eye's shape by using Multi-frame tool.

Step 1. Activate multi-frame tab by clicking on its icon.

Step 2. Change multi-frame range as required. It displays in red colour on timeline as shown in Figure 1.16.

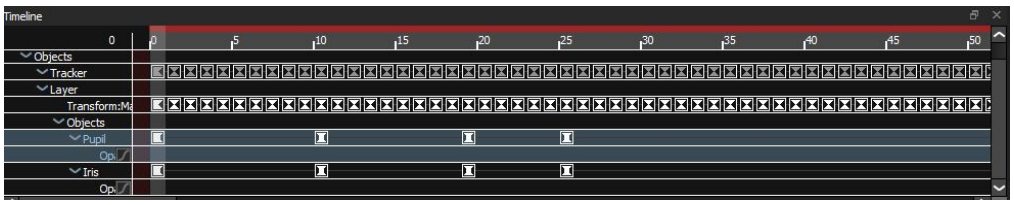


Fig. 1.16 Multi-frame Range

Step 3. Now you can transform any frame within multi-frame range. In Figure 1.17 (a) and (b), you can observe modification in shapes and use of feather.

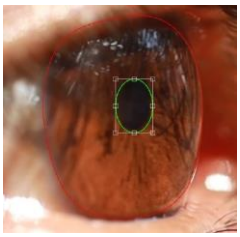


Fig. 1.17 (a) Frame before transform Courtesy-Author

Fig. 1.17 (b) Frame after transform

Step 4. Once you transform a single frame it will be applied on the all frames in multi-frame range. So, you can use multi-frame tool to modify all the shapes at once in the selected range.

1.3 Extracting tracker from the shape

In Practical Activity 1.1, we have created tracker for layer-1. Now to create another shape, how will you track it? Are you going to create another tracker or can use the previous tracker? In this situation, you can use previous tracker. Let's understand the process.

Practical Activity 1.3 – Demonstrate to Extract the tracker and use it over another layer.

Step 1. Create another shape on the viewer by using Bezier tool as shown in Figure 1.18.

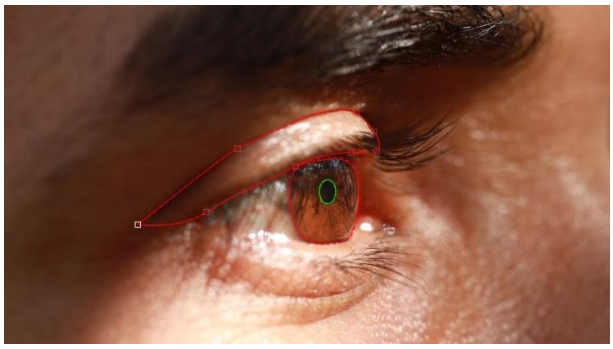


Fig. 1.18 Shape is created on viewer Courtesy-Author

Step 2. The shape is automatically created in layer-1 as shown in Figure 1.19.

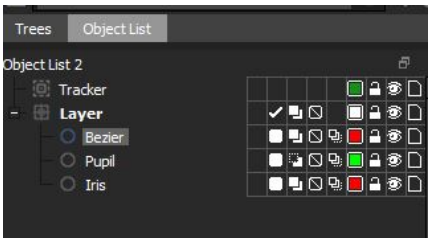


Fig. 1.19 Shape is showing on object list Courtesy-Author

Step 3. Playback the frames and observe that this shape is already animating. It happened because of tracker as shown in Figure 1.20.

1st Frame 100th Frame 200th Frame

Fig. 1.20 Shape movement in different frames Courtesy-Author

Step 4. In previous situation, shape is already placed in the same layer which is affected by tracker. But you cannot place all the shapes in a single layer. You have to create different shapes for breaking the object into the shapes. So we will cut '**Bezier**' shape and place it in different layer as shown in Figure 1.21.

Fig. 1.21 Bezier shape is placed in new layer Courtesy-Author

Step 5. Playback the frames and observe that Bezier shape is not moving because it has been separated from tracker as shown in Figure 1.22.

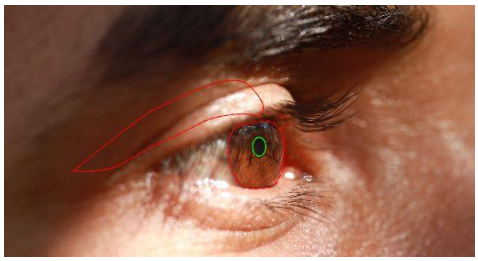


Fig. 1.22 Bezier shape is separated Courtesy-Author

Step 6. Now, we will copy tracker and paste it over the layer-1 as shown in Figure 1.23.

Fig. 1.23 Tracker is placed over layer-1 Courtesy-Author

Step 7. Enable tracker tool on toolbar and click apply button on tracker tab as shown in Figure 1.24.

Fig. 1.24 (a) Tracker icon

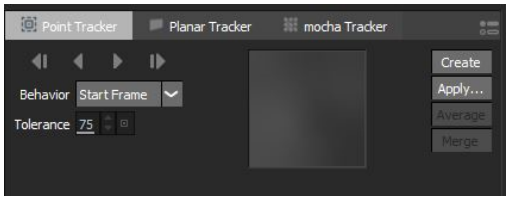
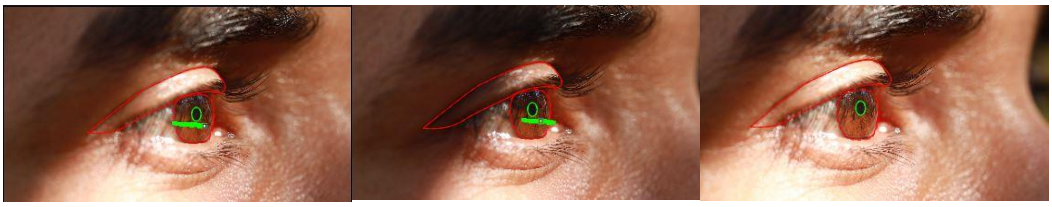


Fig. 1.24 (b) Click on apply button Courtesy-Author

Step 8. Now Bezier shape is animated according to the copied tracker. You can watch these frames as shown in Figure 1.25.



1st Frame 100th Frame 200th Frame

Fig. 1.25 Shape is animated according to tracker Courtesy-Author

It is clear that how you can use a single tracker multiple times in different shape. It will save your time and also helps in animating the shapes. Keep in mind, this technique works well if the shapes have similar movement otherwise it will not animate shapes perfectly.

1.4 Opacity control in timeline

Opacity means transparency of the shapes. Like if a shape is opaque, it means its opacity is 0% and if a shape is fully transparent then its opacity is 100%.

A question may arise that in rotoscoping, we need to breakdown object in different shapes and animate it according to object movement. Then why this opacity control is required.

Recall the Chapter 11 of human roto, where you have dealt with many shapes. You have to carry these shapes even they don't have any use in between. It was really irritating to see these unwanted shapes in roto frame because it makes the rotoscoping complicated.

To overcome this problem, there are two possible ways.

Drag the unused shape outside the viewer/screen.

Keep the opacity at 0% till these shapes have no use.

Let us understand it with an activity.

Here is a face roto of a person, your task is to hide both ear's shape which is showing in the green colour in the Figure 1.26. When they are not placed in the outer edge or you can say when they don't have any use.

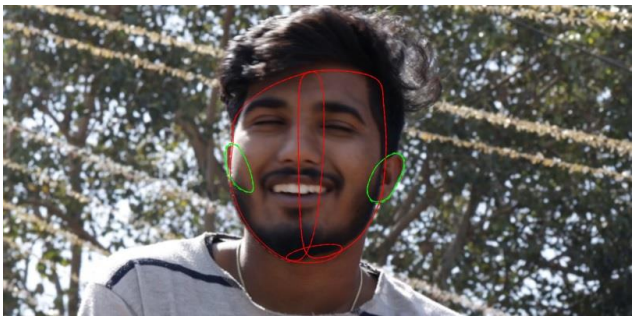


Fig. 1.26 Face Roto of the Person Courtesy-Author

In the Figure 1.26, you are watching the 9th frame of the video. Now we will move in the first frame and the last frame which is 24th frame to observe the ear position.

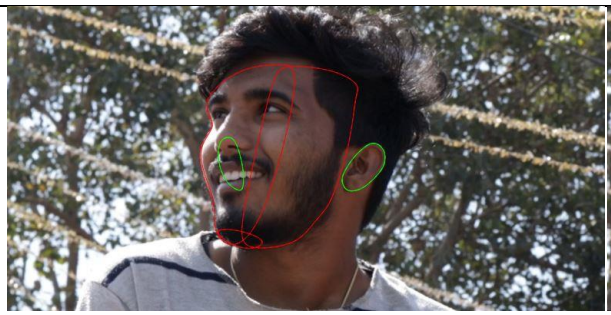


Fig. 1.27 (a) First Frame

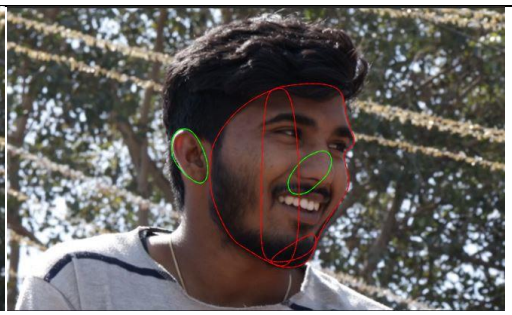


Fig.1.27 (b) Last Frame

If you compare first and last frame, then you will find that,

1. In the first frame, left ear is not visible so its shape is useless at this frame.
2. In the last frame, right ear is not visible so its shape is also useless here.

Now you can understand, these shapes are really irritating when they don't have any use in particular frame. So, you need to remove these shapes from the frame as mentioned in earlier techniques.

First follow,

Method 1

Drag the unused shape outside the viewer.

Step 1. Go to the 9th frame and move towards first frame. Find-out the frame in which, left ear is not visible.

Step 2. You will find 6th frame when the left ear is not visible on viewer. It means you can throw out this shape from the frame. It doesn't mean that you need to delete this shape as shown in figure 1.28. We will bring this shape back when the ear will visible on the upcoming frame.

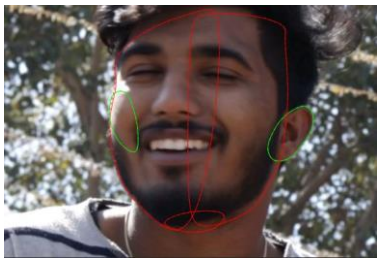


Fig. 1.28 Left ears is not visible in 6th frame Courtesy-Author

Step 3. Now select **Transform** tool from the toolbar and drag this shape outside the frame as shown in Figure 1.29.

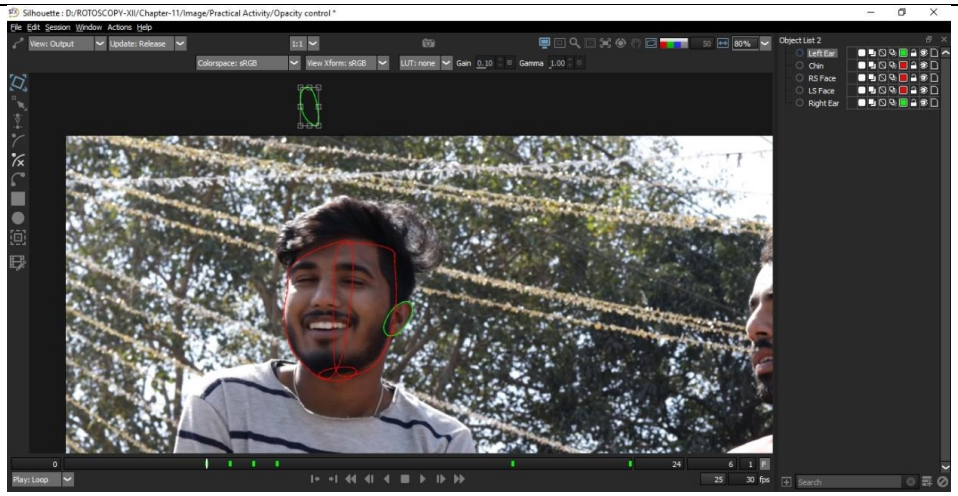


Fig. 1.29 Drag left ear's shape outside the frame Courtesy-Author

Step 4. By the same process you can hide right ear's shape from 10th frame. When right ear is invisible from the frame.

Fig. 1.30 (a) Drag right ear's shape

Fig. 1.30 (b) Key-frame position of shape outside the frame

Step 5. You can bring back the shape by same way but remember to insert a key frame before bringing back the shape so that it will take only 2 frames to comeback.

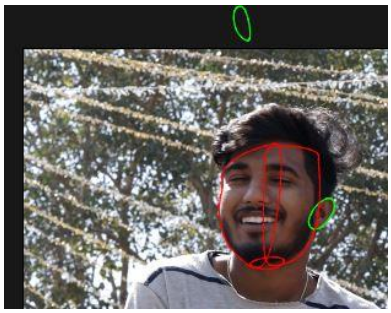


Fig. 1.31 (a) Frame before shape back

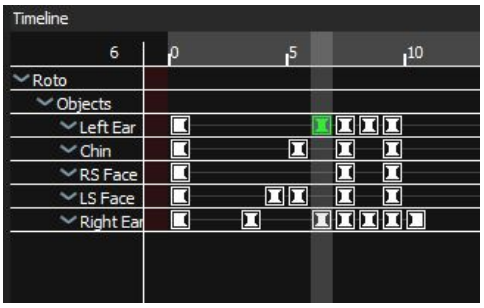


Fig.1.31 (b) Position key-frame

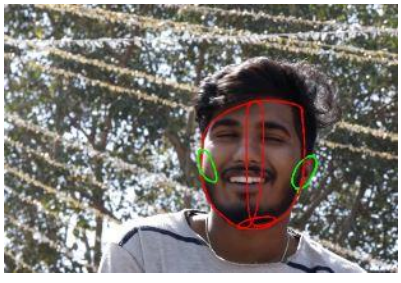


Fig. 1.32 (a) Shape return on viewer

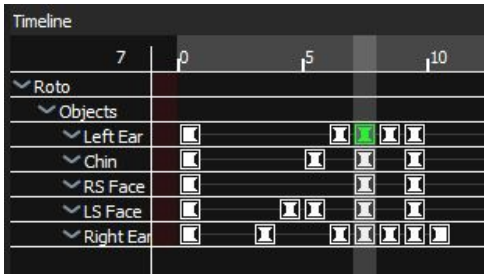


Fig. 1.32 (b) Relative key frame

You have learned first method to get rid of useless or idle shapes. Now we will use second method to solve this problem.

Method 2

Keep the opacity at 0% till these shapes have no use.

In this method, you need to control the opacity of the shape. It is a useful method which helps you to understand the importance of timeline.

Step 1. We will delete those position key-frame and keep the frame in earlier position as shown in Figure 1.33.

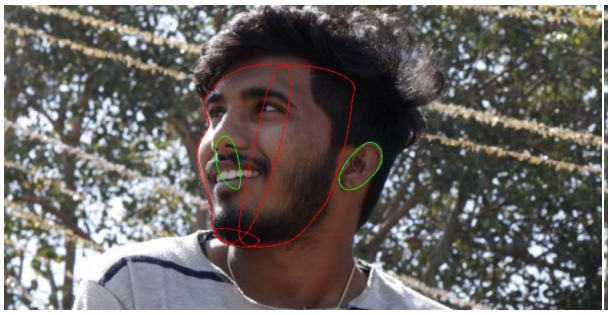


Fig. 1.33 (a) First Frame

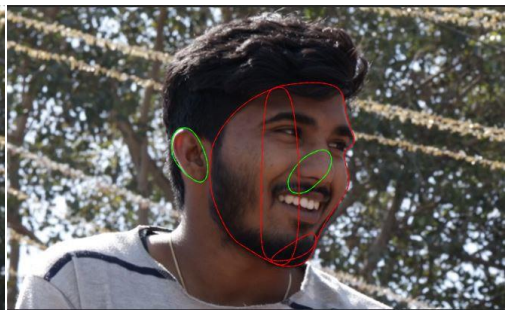


Fig. 1.33 (b) Last Frame

Step 2. Again if we observe 8th frame, then you can find that both the ears are visible. From this point if we move backward then left ear will be invisible and if move forward then right ear will be invisible, as shown in Figure 1.33 (b).

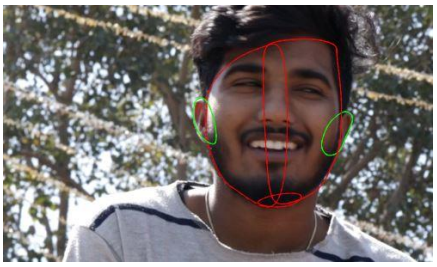


Fig. 1.34 8th frame

Step 3. First, we will move backward from 8th frame and find out when the left ear is invisible from the frame. It's the 6th frame shown in Figure 1.35.

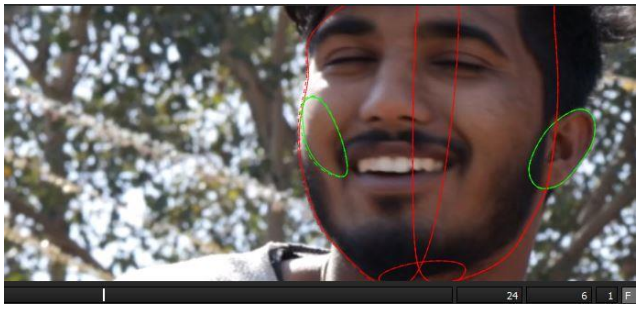


Fig. 1.35 6th frame

Step 4. Now select the transform tool and click on the left ear's shape. Its control is displayed on **object** window as shown in Figure 1.36 (a) & (b).

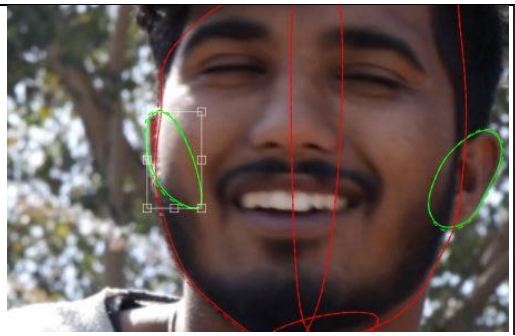


Fig. 1.36 (a) Transform tool on left ear

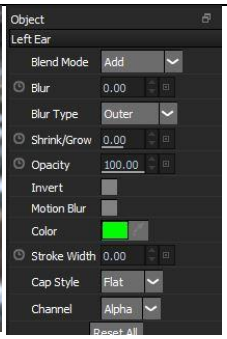


Fig. 1.36 (b) Left ear shape's control

Step 5. Click on the opacity control timer on object window. You can see that opacity control is added in timeline under the left ear as shown in Figure 1.37.

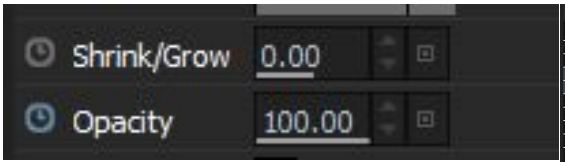


Fig. 1.37 (a) Opacity control timer

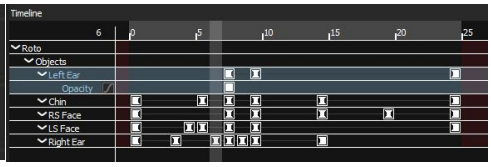


Fig. 1.37 (b) Opacity control in timeline

Step 6. In this frame, change the opacity value to 0. Observe a key frame on timeline as we change the opacity value.

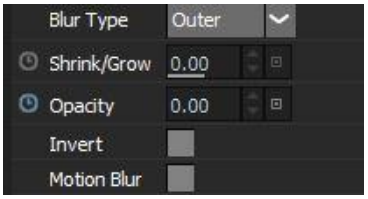


Fig. 1.38 (a) Opacity value is changed

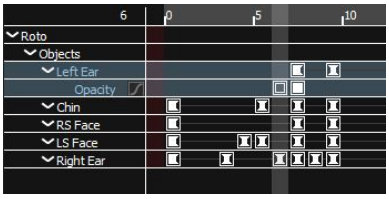
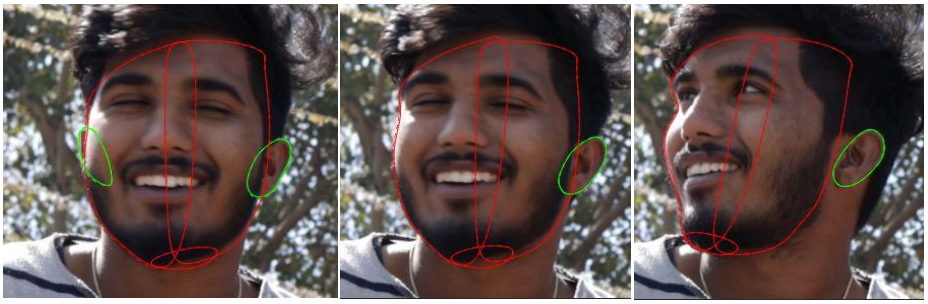


Fig. 1.38 (a) Opacity key-frame

Step 7. Now deselect all the shape from the object list and play the video frames backward now ear's shape is invisible from 6th frame backward.



7th Frame 6th Frame 1st Frame

Fig. 1.39 Opacity key-frame

Step 8. Just think that how can you watch these shapes even in zero opacity. You just need to click on shape name as shown in Figure 1.40 (a) and your shape will visible on viewer panel.

Fig. 1.40 (a) Click on shape name

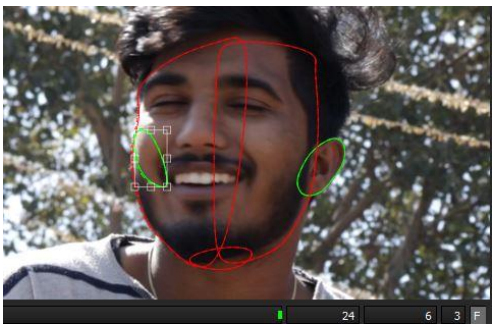


Fig. 1.40 (b) Shape is visible on viewer's panel

Step 9. To bring back these shapes on viewer for roto then change its opacity value 100%.

So now you have learn the techniques like multi-frame, tracking extraction from shapes and opacity control.

Summary

You can make adjustment on multiple frames at once by using Multi-frame tool.

You can use single tracker in multiple times in different shapes.

To remove unused shape from viewer panel, either drag it out from the Viewer panel or Keep the shape's opacity to zero, until the shape is in use.

CHECK YOUR PROGRESS

A. Multiple Choice Questions

1. Place the tracker on the spot, which has highest_____ (a) Brightness (b) Sharpness (c) Contrast (d) Noise
2. You can do backward/forward tracking in (a) Pre-processing control (b) I/O tab (c) Point tracker tab (d) Multi-frame
3. Which of the following is drawn around the Viewer to know that Multi-frame is active (a) Green outline (b) Red outline (c) Yellow Outline (d) Blue Outline
4. Which of the following is applied in multi-frame tool, once you transform a single frame (a) All backward frame in multi-frame range (b) All forward frame in multi-frame range (c) All frames in multi-frame range (d) On single frame
5. You can copy tracker and paste it over the_____ (a) Shape (b) Layer (c) Object (d) Shape and layer
6. Opacity means_____ of the shape (a) Colour value (b) Brightness (c) Transparency (d) Saturation
7. If a shape is opaque, it means opacity is (a) 0% (b) 50% (c) 75% (d) 100%

B. Fill in the blanks

1. After tracking, you can check Shape movement by_____ the video on Viewer.
2. When you adjust shapes, it creates _____ on timeline.
3. Multi-frame allows you to make adjustments across_____.
4. You can use a single tracker _____time in different shapes.

5. During human rotoscoping, keep the opacity_____ percent until the shape is in use.

C. True or False

1. Drag the red ends of the Multi-Frame range bar at the bottom of the timeline to limit the key frames affected by Multi-Frame.
2. If you want to modify shape in multiple frames then you need to use Multi-frame.
3. Opacity control has the ability to hide the shape, which helps you to focus on important shapes.

D. Short answer questions

1. What is Multi-frame tool?
2. How can you use multi-frame tool?
3. Write the process of extracting tracker from any shape.
4. What is opacity control?
5. Why we need opacity controls during animating shapes?

Session 2: Rendering and Exporting Shapes

Till now we have performed rotoscoping of different objects such as organic and inorganic objects. We have also learned the techniques about wire and rig removal. But we have never discussed about the final output. In this chapter, you will understand the techniques of rendering the mattes and rendering setting. How can you use these mattes in compositing software Adobe After Effects and editing software Adobe Premiere. You will also learn to import and export shapes from SilhouetteFX© and utilization of shapes in compositing shapes.

2.1 Rendering

Rendering is a process that involves the generation of a two-dimensional or three-dimensional image from a model by using application programs. Rendering is mostly used in architectural structures, computer games and animation films, simulators, TV special effects and design visualisation. The methods and features used may differ depending on the project. Rendering aims to improve productivity and reduce design costs.

After completing the work in Silhouette©, you need to render the final result. Do you remember the boat which we have used in earlier session? Now it is the time to get the final output from the boat as shown in Figure 2.1. First, we will quickly watch the project again, so that you can remind it easily.

Fig. 2.1 SilhouetteFX© Project Courtesy-Author

Let us demonstrate to render the shapes in Practical Activity 2.1.

Practical Activity 2.1 – Render the focus object.

Step 1. In the Trees window, add output nodes after the nodes to render as shown in Figure 2.2. If output node is already added, then click on that node on trees window.

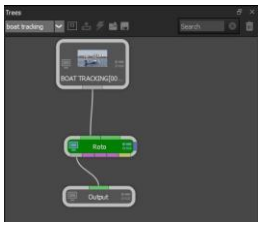


Fig. 2.2 Add Output Node in Tree Window Courtesy-Author

Step 2. In the Output node, set the file format type. The format setting allows you to select from various file formats. You can save the file in the various file formats such as – Cineon, DPX, TIFF, JPG, Open EXR, PNG, SGI, TIFF and Targa as shown in Figure 2.3.

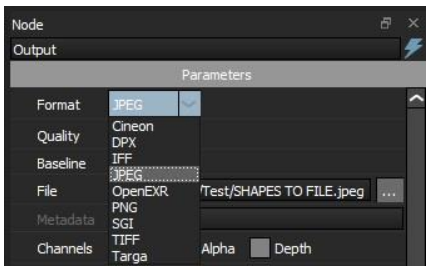


Fig. 2.3 Select File Format Courtesy-Author

Step 3. Enter the path and file name for the rendered file in the File field. For this, click the Browse icon on the right, as shown in Figure 2.4

Fig. 2.4 Enter the Path and File Name Courtesy-Author

As far as file naming is concerned, you only have to type in a name as periods, hash marks for padding, as shown in Figure 2.5. Here, file extensions are not required unless you want to manually enter them. For example, if you choose to manually enter the file padding and extension, the filename should have 3 things:

- The image name

1. # for the frame placeholder.

2. An extension: .exr = exr files, .cin = Cineon files, .tif = Tiff files, etc.

Therefore, if you enter a name something like test.####.exr, SilhouetteFX© will render out test.0001.exr, test.0002.exr, etc.

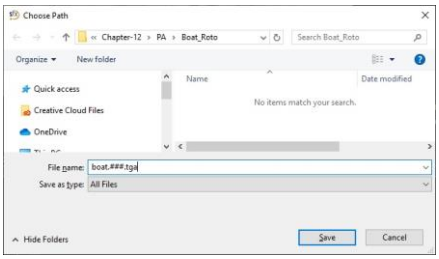


Fig. 2.5 File Padding and Extension Courtesy-Author

Step 4. You can confirm how the files will be formatted by looking it on output node sample field, as shown in the Figure 2.6

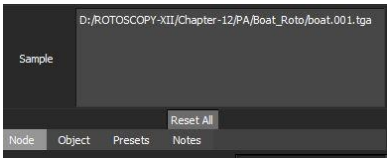


Fig. 2.6 Output node sample field Courtesy-Author

Step 5. Choose the appropriate channels to render. You can choose from RGB, Alpha and Depth, as shown in the Figure 2.7.

Fig. 2.7 Different channels Courtesy-Author

Step 6. If you are rendering stereo project, select whether you want to render the Left, Right or Both. The Left and Right Views are simultaneously using the Views popup menu.

Fig. 2.8 Stereo View setting Courtesy-Author

Step 7. After all these selection and settings, go to **Session > Render Session** or press Ctrl+R.

Step 8. The **Render Options** window opens as shown in Figure 2.9.

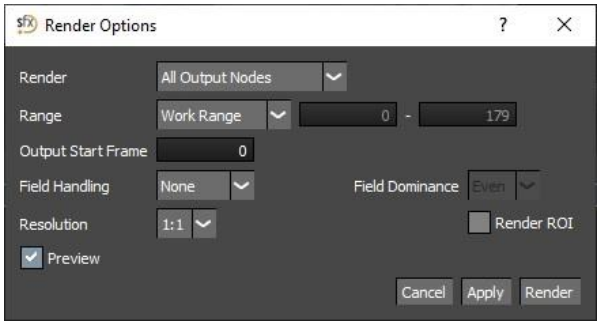


Fig. 2.9 Render Options Courtesy-Author

Step 9. Choose whether to render All Output Nodes or just the Selected Output Nodes as shown in Figure 2.10. If you choose **selected output** node then it needs to be selected for working the option.

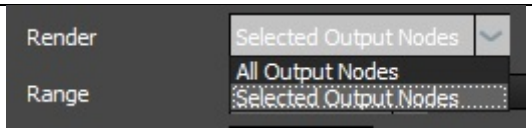


Fig. 2.10 Render Options Courtesy-Author

Step 10. Select all frames from the Range option to render as shown in Figure 2.11.

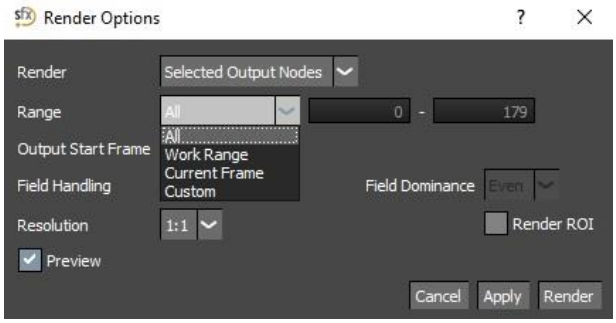


Fig. 2.11 Range Selection Courtesy-Author

Step 11. Enable Preview and select Render as shown in Figure 2.12.

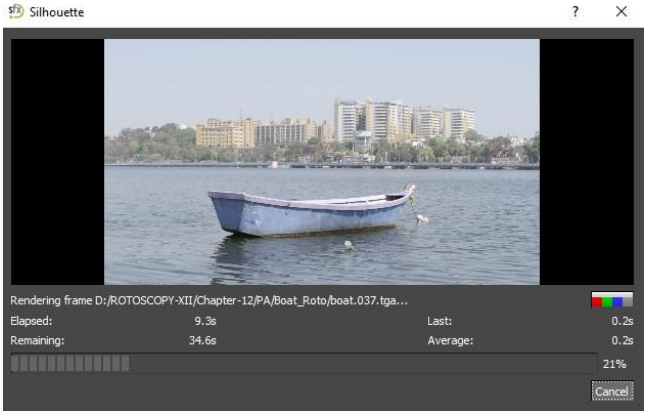


Fig. 2.12 Rendering in progress Courtesy-Author

Step 12. After the completion of rendering, File will be saved on destination folder.

More to know

You can utilize some other option while perform rendering. For this select **Action> Render**; here you will get these three option-

- **Layers to Separate Files –** Renders layers to separate files.

1. **Shapes to File Tree –** Renders all shapes in the selected Roto node, each to its own file, organized by folders based on layer names.
2. **Shapes to Separate Files –** Renders shapes to separate files.

2.2 Utilization of matte in After Effects

Once the work is completed the role of compositor begins. But it is important for a Roto-Artist to understand the further process. You may be curious about how these shapes helps compositor in compositing. So let's learn this process through Practical Activity 2.2.

Practical Activity 2.2 – Import shapes in After Effects and use it for compositing.

Step 1. Create a new project in Adobe After Effects as shown in Figure 2.13.

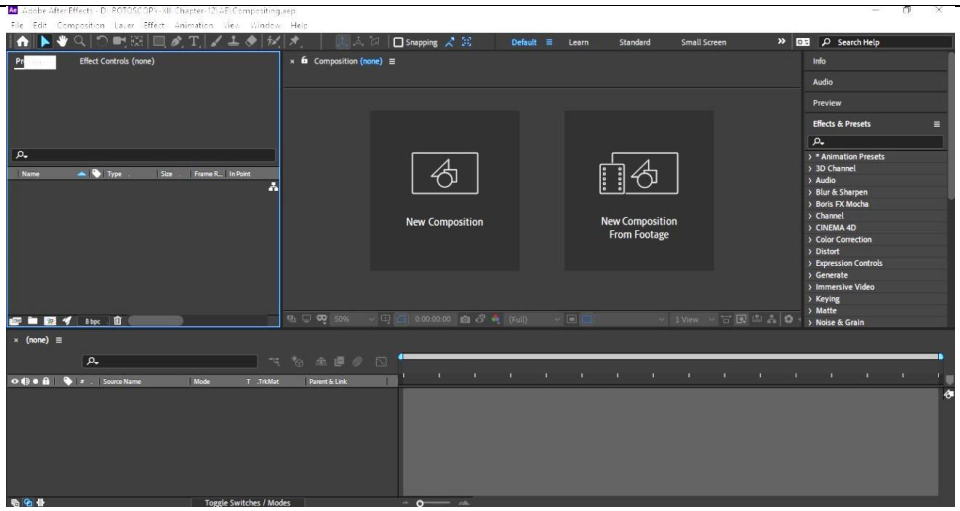


Fig. 2.13 Create a Project in Adobe After Effects software Courtesy-Author

Step 2. Import the shape in and insert it in timeline as shown in Figure 2.14. Don't forget to import original video layer whence the object is extracted.

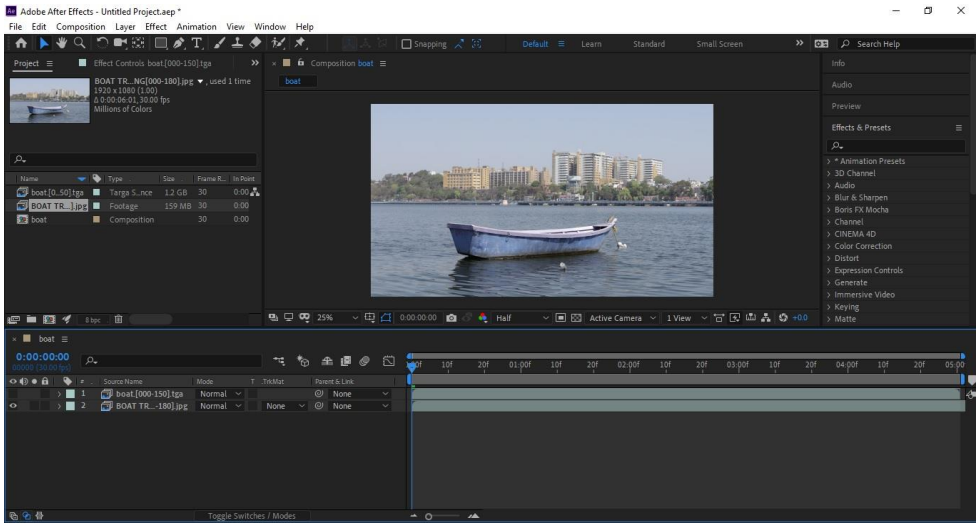


Fig. 2.14 Import the shapes Courtesy-Author

Step 3. You need to import another object for background. Import a video or Image and insert it in timeline as shown in Figure 2.15. So far you have not seen any change in composition.

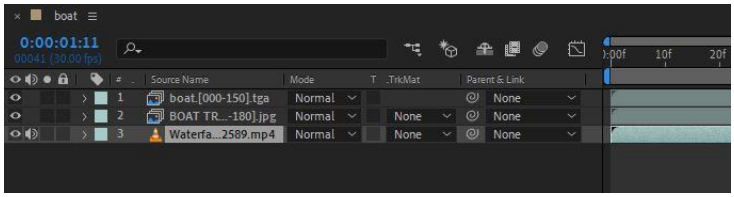


Fig. 2.15 Background layer place in bottom Courtesy-Author

Fig. 2.16 Composition after inserting the background layer Courtesy-Author

Step 4. Now open the **track matte** option on original video footage as shown in Figure 2.17.

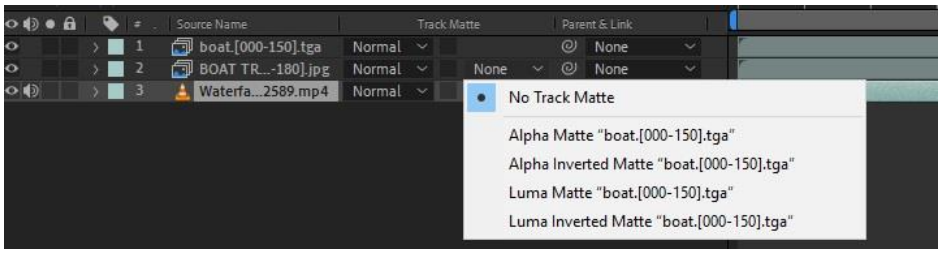


Fig. 2.17 Track matte Option Courtesy-Author

Steps 5. Observe the Figure 2.18, there are four options – Alpha Matte, Alpha Inverted Matte, Luma Matte and Luma Inverted Matte. You need to select Alpha Matte.

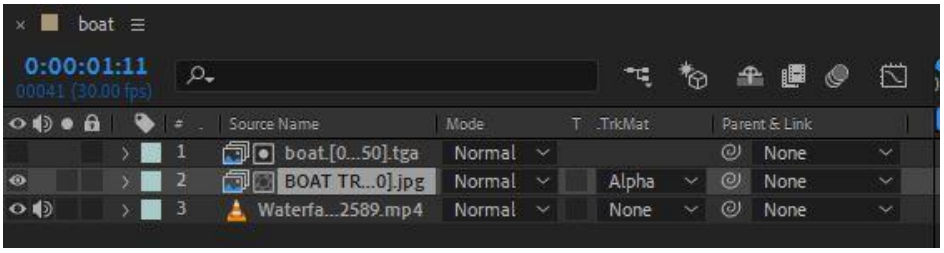


Fig. 2.18 Select Alpha matte in track matte option Courtesy-Author

Step 6. Now you can see that boat is extracted from the video and inserted over the background layer as shown in Figure 2.19.

Fig. 2.19 Composite frame Courtesy-Author

Step 7. You need to compose both objects in such manner so that it will look natural. Here is the final frame shown in Figure 2.20.

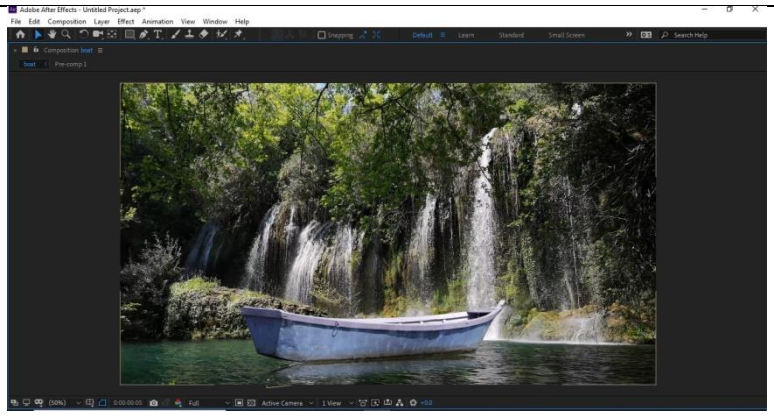


Fig. 2.20 Final composition Courtesy-Author

2.3 Export/Import shapes from SilhouetteFX©

Silhouette can export and import shapes for different softwares like After Effects, Elastic Reality, Fusion, gMask (Combustion, Flint, Flame, Inferno), Nuke and Shake 4.x SSF.

As we are using two software which is Adobe After Effects© and SilhouetteFX©.

Therefore we will export and import shapes between these software. If compositor wants shape for different software which is mentioned earlier then you can also export shapes for those software.

Here are the steps which we will follow.

- Export the shapes from SilhouetteFX© software.

1. Import the shapes in after effects© software.
2. Export shapes from after effects©.
3. Import it in SilhouetteFX©.

2.3.1 Export the shapes from Silhouette software to after effects.

Step 1. Open the existing project in SilhouetteFX©v7.5 as shown in Figure 2.21.

Fig. 2.21 Silhouette project Courtesy-Author

Step 2. Select the shapes from **object list** to export as shown in Figure 2.22.

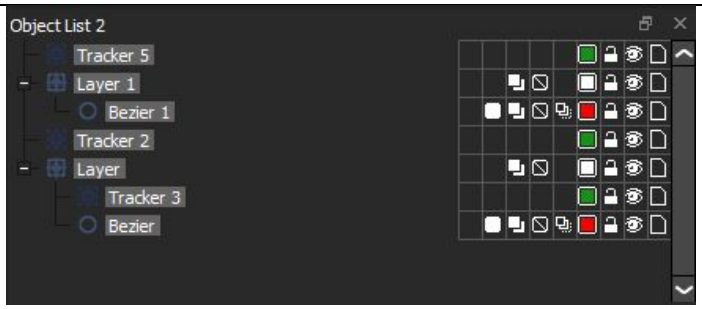


Fig. 2.22 Selection of shapes in Object List Courtesy-Author

Step 3. Choose **File > Export** and select the shape format to export as shown in Figure 2.23.

To export to After Effects masks, use the Silhouette Shapes option. The Silhouette Shape Import/Export Plug-in is then required to import Silhouette Shapes into After Effects.

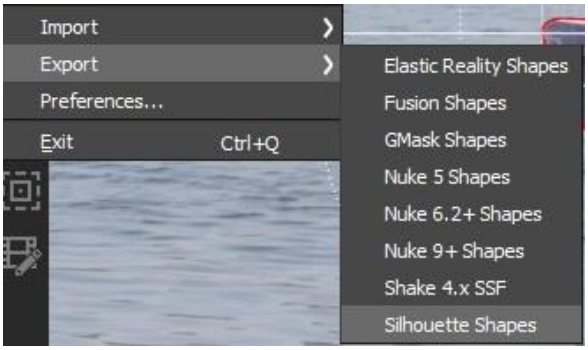


Fig. 2.23 Different Export Options Courtesy-Author

Step 4. When the file browser opens, type a name and click **OK** to save the file as shown in Figure 2.24.

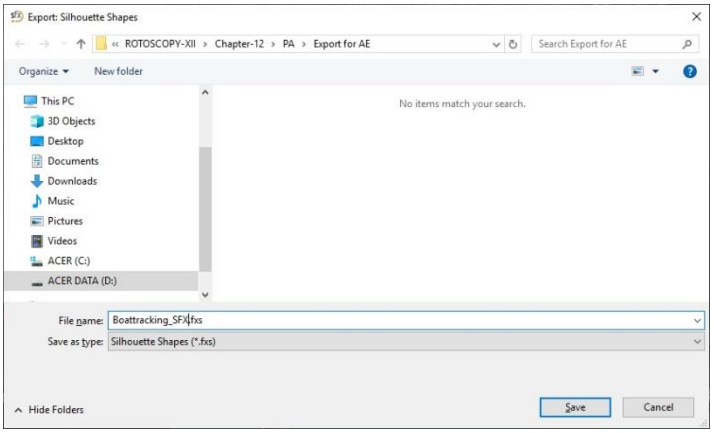


Fig. 2.24 File Browser Courtesy-Author

Step 5. File saves in .fxs format as shown in Figure 2.25.

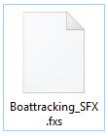


Fig. 2.25 File Format

2.3.2 Import the shapes in After Effects

The SilhouetteFX© Shape Import/Export Plug-in for Adobe After Effects© is required to Import Silhouette Shapes and convert them to Adobe After Effects© masks.

When importing Silhouette Shapes, the shape parameters transfer into After Effects© such as, opacity, blur, shape color, shape name, invert and locked states, transfer mode and per-shape motion blur state.

Practical Activity 2.3 – Import the Silhouette's exported shapes in Adobe After Effects©

Step 1. Start Adobe After Effects©. Open a project and select a layer in the Timeline as shown in Figure 2.26.

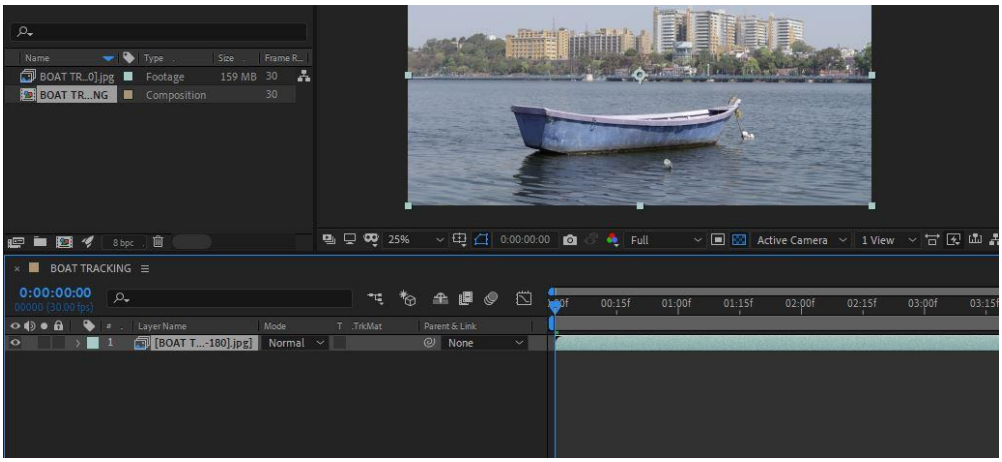


Fig. 2.26 Select a layer in Adobe After Effects© Timeline Courtesy-Author

Step 2. From the After Effects File menu, select **Import > Silhouette Shapes**. A file browser opens as shown in Figure 2.27. Select the shape file to import and click OK.

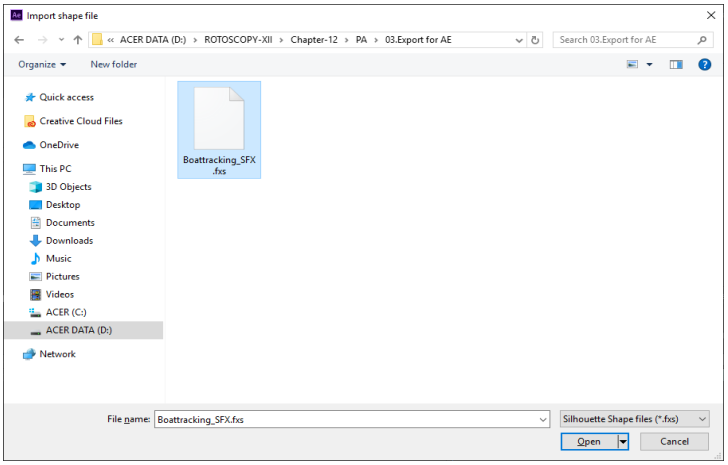
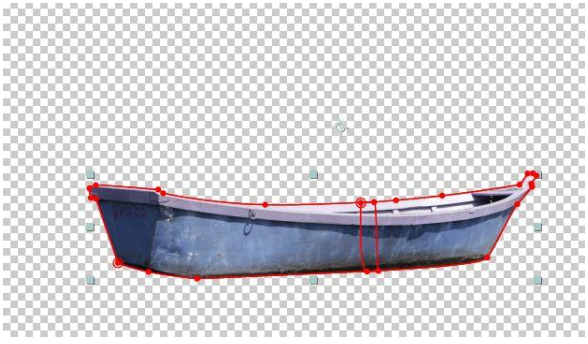


Fig. 2.27 Select the Shape file from File browser Courtesy-Author

Step 3. Shapes are imported in a form of mask. You can see them in composition panel and timeline.



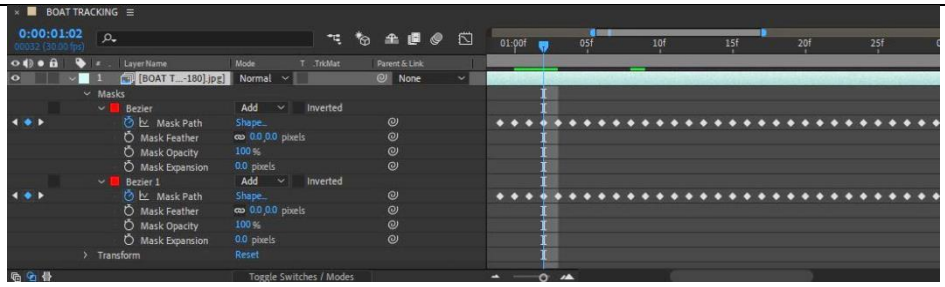


Fig. 2.28 Composition Panel and Timeline Courtesy-Author

Step 4. Now you can modify individual mask of object.

More to Know

When importing and exporting Silhouette© Shapes in After Effects©, the general rule is that the After Effects composition size must match the Silhouette session size for shapes to import and export properly. However, as long as the ratio of the sizes between the After Effects composition and the Silhouette session match, you can successfully import and export shapes between them. For instance, you could import or export shapes from a 2000 × 1000 Silhouette session to a 1000 × 500. After Effects composition with no problems, as long as the pixel aspects were the same.

2.3.3 Export shapes from After Effects©

When exporting After Effects masks, the following shape parameters transfer into Silhouette: opacity, blur, shape color, shape name, invert and locked states, transfer mode and per-shape motion blur state.

Practical Activity 2.4 – Export Adobe after Effects© shapes

Step 1. Start Adobe After Effects©, open a project and select a layer in the Timeline that contains After Effects masks as shown in Figure 2.29.

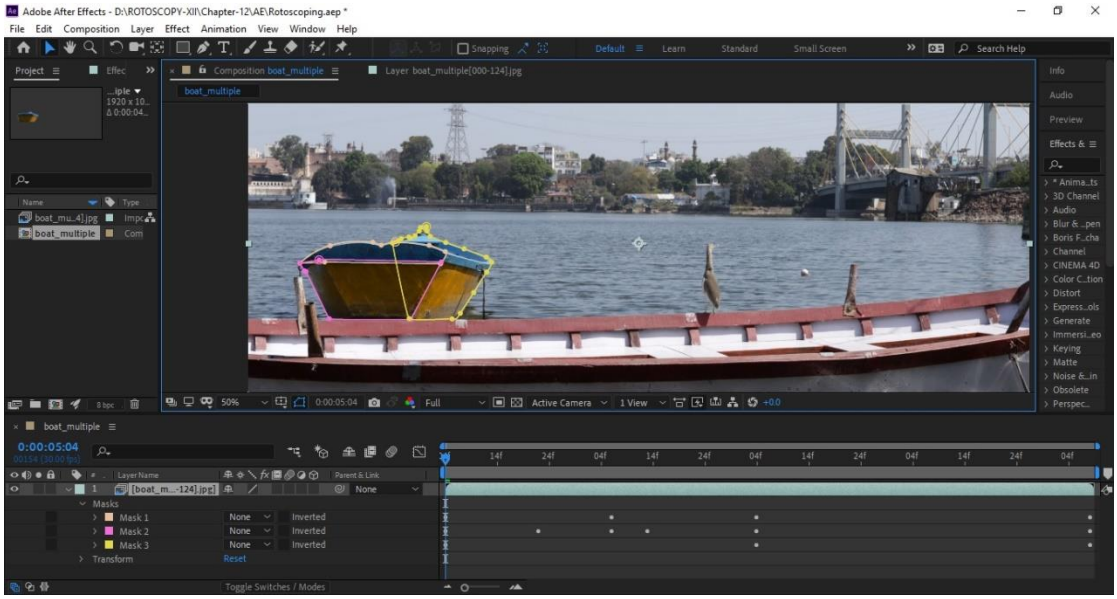


Fig. 2.29 Selected layer in the timeline which has different masks Courtesy-Author

Step 2. From the After Effects File menu, choose **Export > Silhouette** 5+ Shapes. A file browser opens. Type a name and press OK to save the file as shown in Figure 2.30.

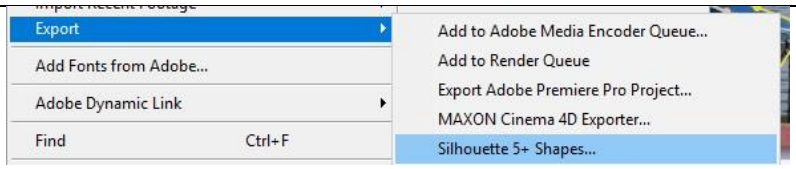


Fig. 2.30 Exporting masks in silhouette shapes

Step 3. All After Effects masks from the selected layer are exported and a file is saved with an .fxs file extension.

2.3.4 Import After Effects© shapes in Silhouette

Silhouette, After Effects, Commotion, Elastic Reality and Shake 4.x SSF

Shapes can be imported into SilhouetteFX©.

Step 1. Select roto node in the Session as shown in Figure 2.31.

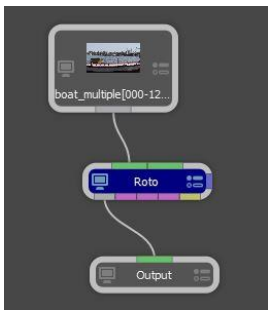


Fig. 2.31 Roto Node Courtesy-Author

Step 2. Choose **File > Import** and select the shape format that you would like to import as shown in Figure 2.32.

Fig. 2.32 Select the shape format for import Courtesy-Author

Step 3. A file browser opens. To import, select the shape file and click on Open button as shown in Figure 2.33.

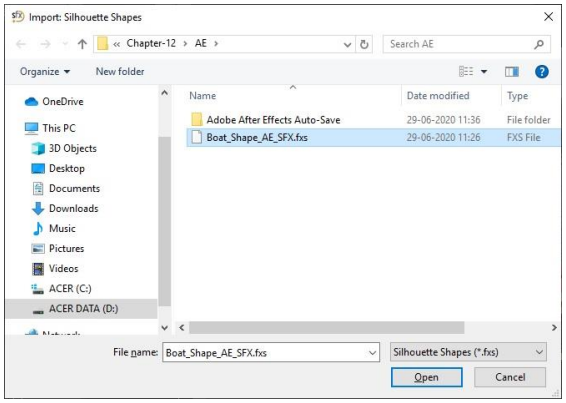


Fig. 2.33 Select the shape file Courtesy-Author

Step 4. The shapes are added to the current session as shown in Figure 2.34.

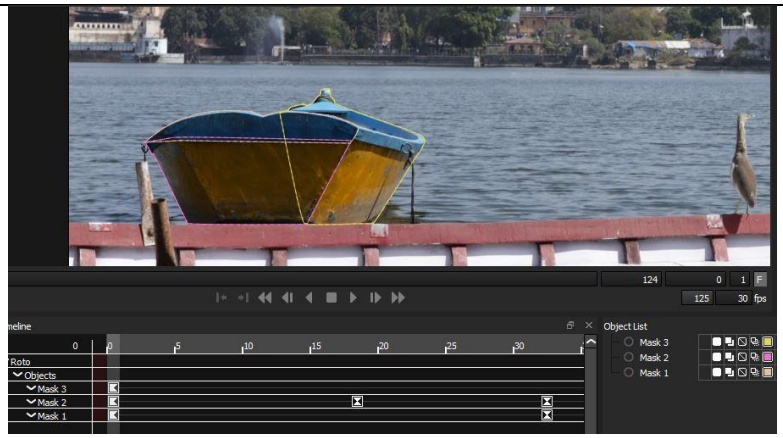


Fig. 2.34 Shape are added in object list Courtesy-Author

More to Know – When you import after effects masks in silhouette© shapes then you cannot import its feather. So whenever you export shapes for silhouette©, edge feather need to be added in silhouette software later.

2.4 Rendering shapes to channels

Shapes can be assigned to different channels when rendering. Let us demonstreate to export the shapes in different channels in the following activity.

Step 1. Create four shapes as shown in Figure 2.35. See these shapes in red, green, yellow and white outline.

Fig. 2.35 Four Shapes Courtesy-Author

Step 2. Select a shape and in the Object window, set the Channel parameter to Red.

Fig.2.36 (a) Select shape-1

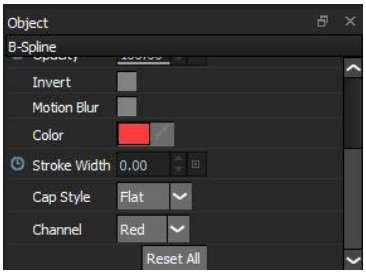


Fig.2.36 (b) Set channel parameter to red Courtesy-Author

Step 3. Assign the other three shapes as Green, Blue and Alpha.

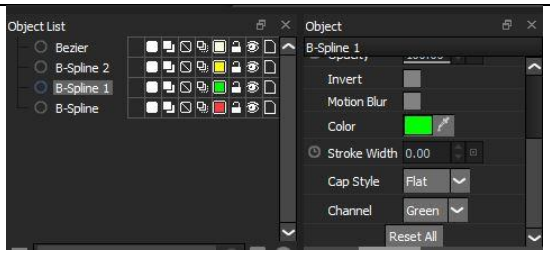


Fig. 2.37 (a) Set channel parameter to Green

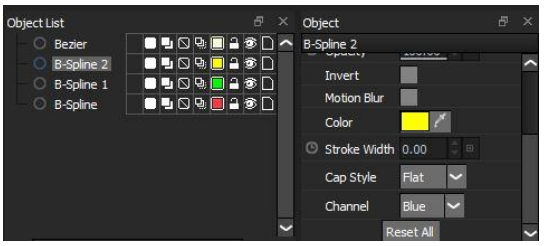


Fig.2.37 (b) Set channel parameter to Blue

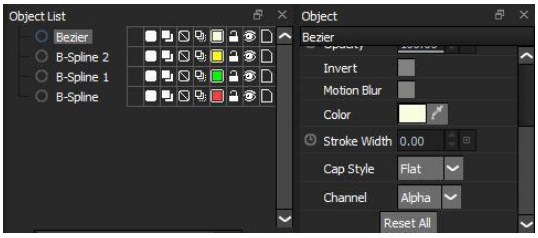


Fig. 2.37 (c) Set channel parameter to Alpha

Step 4. After assigning the shapes to different channels, you can visualize the results prior to rendering using **View > Channels** in conjunction with the Alt-R, G, B and A shortcut keys. Choose **View > Channels,** as shown in Figure 2.38.

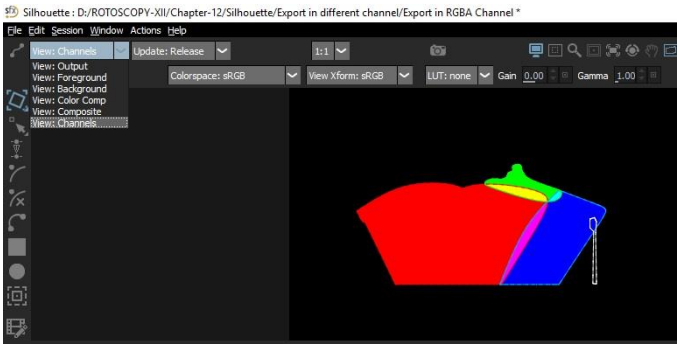


Fig. 2.38 Shapes are assigned to different channels Courtesy-Author

Step 5. Use the Alt-R, G, B and A shortcut keys to see which shapes are assigned to the various channels as shown in Figure 2.39.

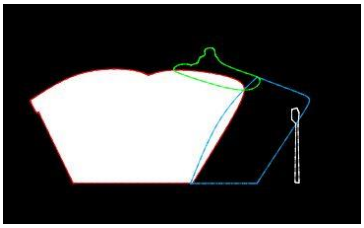


Fig. 2.39 (a) Red Channel

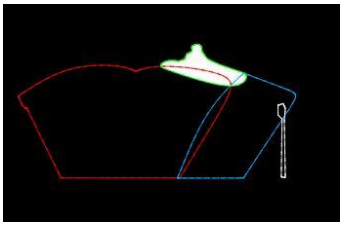


Fig. 2.39 (b) Green Channel

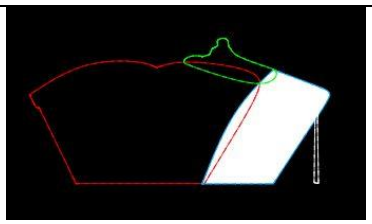


Fig. 2.39 (c) Green Channel

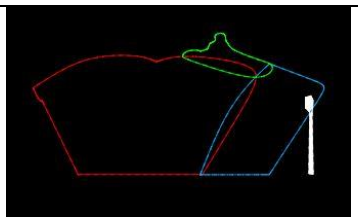


Fig. 2.39 (d) Alpha Channel

Step 6. When ready, render shapes into the assigned channels by connecting the Roto node's **Channels** output to an **Output** node as shown in Figure 2.40.

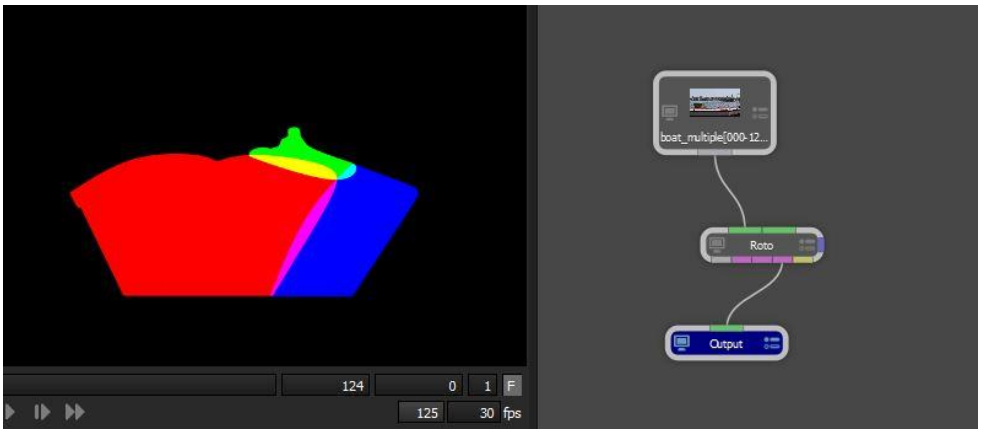


Fig.2.40 Connects Roto Channel output to output node Courtesy-Author

Step 7. In the Output node, choose a file format that supports RGBA and make sure that RGB and Alpha are enabled in the Channels field.

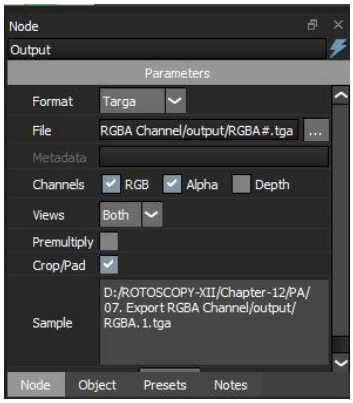


Fig. 2.41 Output Settings Courtesy-Author

2.5 Rendering Shape Outlines or Color Filled Shapes

Shapes can be outlined or filled with a color and rendered in the RGB output.

Step 1. Create some shapes as shown in Figure 2.42.

Fig. 2.42 Shapes are created Courtesy-Author

Step 2. In the Node parameters enable the color by selecting the option **Color > Enable** as shown in Figure 2.43.

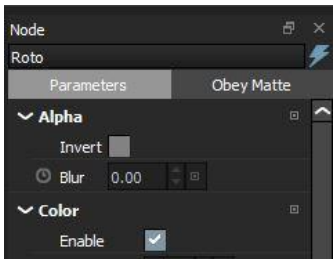


Fig. 2.43 Enable Colour in Node Parameter Courtesy-Author

Step 3. Turn up the Outline Size parameter. The shape outlines will now render in the RGB output. To change the shape's outline color, use the **Shape > Color** parameter.

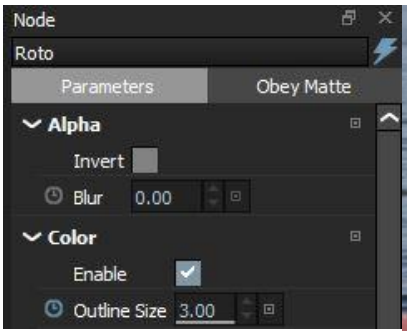


Fig.2.44 (a) Set Outline Size Courtesy-Author

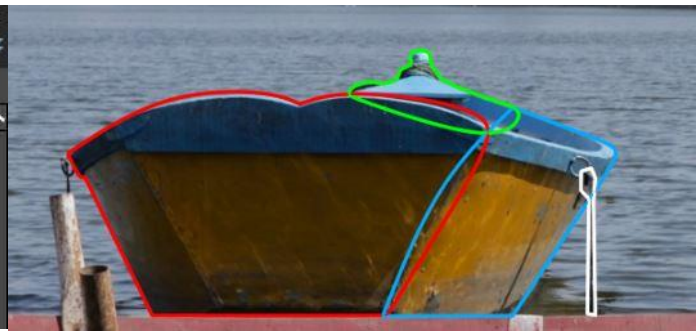


Fig.2.44 (b) Changes in Outline Size

Step 4. Set the Outline Size parameter to 0 and turn up the Fill Opacity as shown in Figure 2.45 (a). The shapes are now filled with a color in the RGB output as shown in Figure 2.45 (b).

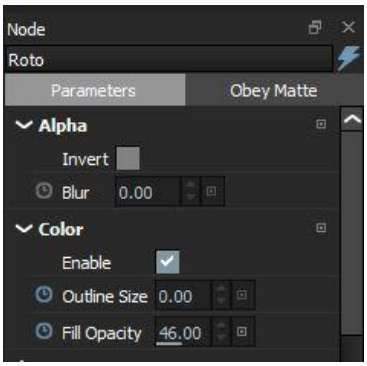


Fig.2.45 (a) Set the Fill Opacity

Fig.2.45 (b) Results of Fill Opacity on Viewer Courtesy-Author

Step 5. Select an individual shape and change the color in the Object window. Each shape can have its own color.

Fig.2.46 (a) Select the Individual shape Courtesy-Author

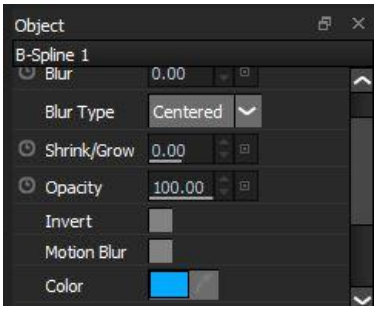


Fig. 2.46 (b) Change the Colour

Step 6. It is possible to globally change the opacity using the **Color > Fill Opacity** node parameter. You can also change the opacity of each shape separately using the **Shape > Opacity** control in the Object window.

Summary

3D rendering is the process of a computer converting raw data from a 3D scene (polygons, materials, and lighting) into a final product. Typically, the output is a single image or a collection of photos that are rendered and combined.

Choose the appropriate channels to render the shapes such as RGB, Alpha and Depth.

In stereo project, choose the views (left, right, both) which you want to render.

Use track matte option on roto footage, to composite various videos.

Various shapes can be imported/ exported from Silhouette software to other software like After Effects, Elastic Reality, Fusion, gMask, Nuke and Shake.

Silhouette shapes is exported in .fxs format.

When importing Silhouette Shapes, the shape parameters transfer into After Effects© such as opacity, blur, shape color, shape name, invert and locked states, transfer mode and per-shape motion blur state.

CHECK YOUR PROGRESS

A. Multiple Choice Questions

1. Rendering is not used in (a) Architectural design (b) Video games (c) Animated movie (d) Video shooting
2. Which of the following is selected in output node to export Alpha Matte (a) RGB (b) Alpha (c) RGB and Alpha (d) CMYK
3. During compositing in After Effects, place the alpha matte ____the original layer (a) Below (b) above (c) within (d) between
4. To export to After Effects masks, use the (a) Elastic reality shapes (b) GMask shapes (c) Fusion Shapes (d) Silhouette Shapes
5. Which of the following parameter is not transfers when importing Silhouette shapes in After Effects (a) Opacity (b) Blur (c) Shape colour (d) Feather
6. Which of the following is not possible to import when importing After Effects masks in silhouette shapes (a) Shape name (b) Blur (c) Feather (d) Shape colour

B. Fill in the blanks

1. After completing the work in Silhouette, you need to_____ the final result.
2. In silhouette, select the shapes from_____ which you want to export.
3. When you export shapes from Silhouette to After Effects, it is exported in _____format.
4. In After effects, Silhouette shapes are imported in form of____.
5. Shapes can be assigned to different_____ when rendering.

C. True or False

1. Rendering helps increase efficiency and reduce cost in design.
2. When Export the shapes from Silhouette software to after effects, the file saves in .dpx format.
3. After Effects composition size must match the Silhouette session size for shapes to import and export properly.
4. Use the Alt-R, G, B and A shortcut keys to see which colours are assigned to the various channels.
5. To change the shape's outline color, use the Shape > Color parameter.

D. Short answer questions

1. What is rendering?
2. What are the steps to rendering the shapes?
3. What is File Padding and Extension?
4. What is utilisation of matte after rendering?
5. Write the steps to export the shapes from Silhouette to After Effects?
6. How can you export the shapes from after effects to silhouette software?
7. How can you render shapes in different channels?
8. How can you render colour filled shapes?

Session 3. Rotoscopy Work Environment

The world of animation is open after rotoscoping. It is required in all animations and VFX houses. Rotoscoping is a starting point for career. One can explore his or her capabilities and take career further in compositor, VFX supervisor and many more. (Figure 3.1) In this session you will understand all about animation and visual effects industry, which will prepare you for the future.

Fig. 3.1 Rohan is searching about Animation and VFX Career options Courtesy-Author

3.1 Difference between CGI, VFX, SFX and FX

Some abbreviations are used in the post-production field. So it is essential to understand some of the important terms.

3.1.1 CGI

It stands for Computer-Generated Imagery. It is a 3D picture prepared by using computer hence the name computer-generated imagery. It can be a video game, 3D animation, may be just a model made in computer as shown in Figure 3.2. It does not include the live-action shot.

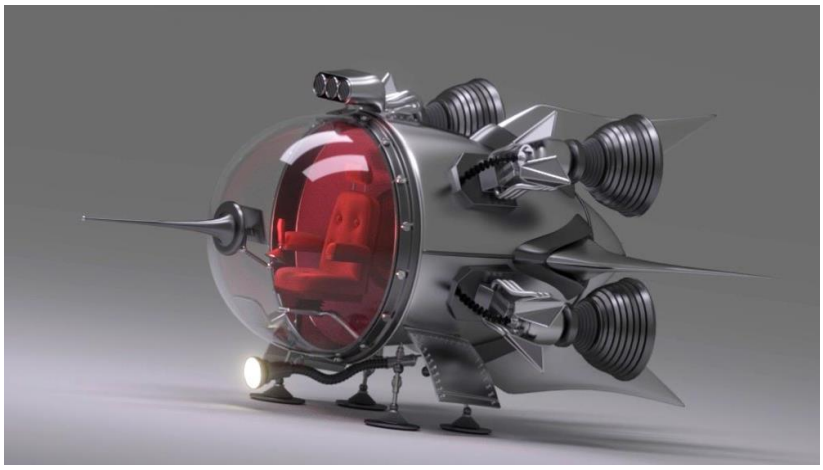


Fig. 3.2 3D Model of spaceship

3.1.2 VFX

It uses different elements so it can be 3D or 2D. These elements are integrated in live-action shot that was filmed on set as shown in Figure 3.3. This is the basic difference between visual effects and CGI.

Fig. 3.3 Visual Effect shots from the Movie Aladdin Courtesy- ILM

3.1.3 SFX

It stands for special effects. It was there before the invention of computers and 3D. All of these explosions, mechanical or any live effects as shown in Figure 3.4 has to be created on set instead of CG in post-production.

Fig. 3.4 (a) Mechanical Character Courtesy- Columbia Pictures

Fig. 3.4 (b) Fire Special Effects Courtesy- Martin Goeres

3.1.4 FX

It is a same kind of special effects which is created on set. But nowadays we can create all the simulations fires, explosions, rain and many more using the computer. It is called digital effects or FX. A typical digital effects is shown in Figure 3.5.

Fig. 3.5 Digital effects

3.2 Connection between all these departments

Digital effects (FX) can be used in CGI like a 3D video game or in visual effects like an integrated explosion in the shot. But it is still under the CGI. CGI can stand alone like a 3D animation or as a part of visual effects for example creating a background to replace the green-screen. (Figure 3.6)

Special effects made on set so it is not directly connected with post production. So, it is separate from the group.

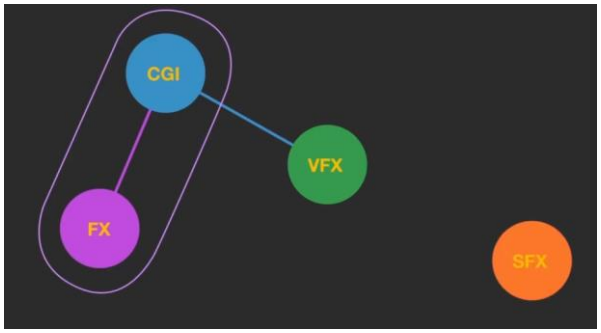


Fig. 3.6 Connection between different departments Courtesy- Author

If you put them in a chronological order it would be visual effects first then CGI as a part of visual effects and then digital effects (FX) as a part of a CGI as shown in Figure 3.7.

Visual effects artist can have CGI skills. But CGI artist does not have Digital effects skills. CGI artists only work with 3D world. Anyone who knows how to integrate an element into the footage can work as visual effects artist.

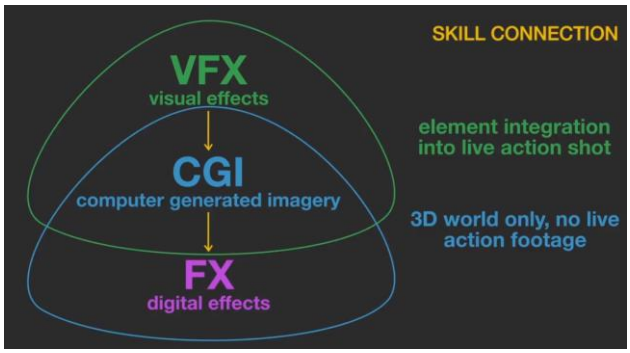


Fig. 3.7 Skill Connections Courtesy- Author

3.3 Different work area

CGI artist is different from visual effects artists. Also, a question may arise where the Roto artist stands? There are various areas which are closely related to each other. First, we will discuss about compositing, since all the work are closely connected with this.

3.3.1 Compositing

Compositing is combining different elements that were filmed separately or created separately. A typical compositing scene is shown in Figure 3.8. Combining them into one scene and making it look as if it was filmed in one location at the same time.

Fig. 3.7 Compositing scene of movie Avengers – Infinity War Courtesy- Marvel Studio

Let us overview the process of how the compositor is connected to other departments for receiving the files (Figure 3.9). Now different projects have got different structure and they might work in a different way. So before receiving any files for compositing, it sends to different department. Where they are cleaned and prepared for compositing later.

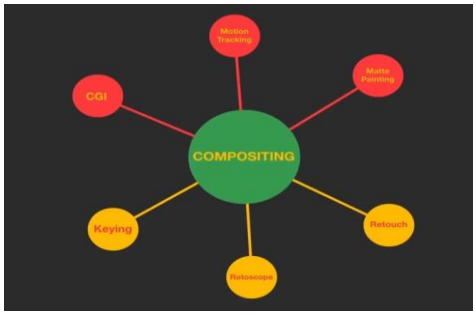


Fig. 3.9 Different department connected with Compositor Courtesy- Author

3.3.2 Chroma Keying

If there is a green screen as shown in Figure 3.10 that needs to be removed in the scene. The shot first is being sent to the Keying Department, who removes the green screen, prepares the image and send it to compositor.

Fig. 3.10 Chroma key Courtesy- Marvel Studio

3.3.3 Rotoscoping

Sometimes there are scenes without the green screen and may be the object needs to be cut out from the background. A rotoscoping department works in this case. They extract the object frame by frame from the background and send it to compositor to integrate it later.

3.3.4 Retouch

If you want to remove any minor object such as hanging wires or microphone picturised during shooting and if that should not be shown to the audience, it needs to be removed from the shot is done by the retouching personnel in that department. (Figure 3.11) They just paint out the objects that should not be there and then they create the clean shot for you without these objects.

Fig. 3.11 Remove the wire Courtesy- Marvel Studio

All these three are called **Prep/Paint** that stands for preparation and painting as shown in Figure 3.12.

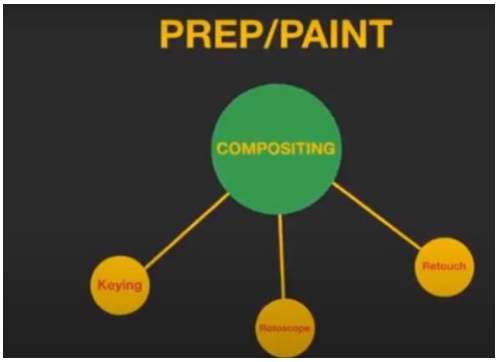


Fig. 3.12 Prep/Paint Courtesy- Author

Basically Prep/Paint means cleaning out the shots and preparing the footage for the compositor. Now different projects require different elements. It needs to be integrated into the scene. Different departments use different skills to achieve. When the green screen is removed we need to replace it with something. It can be just a photo shoot that is filmed separately and then placed it or may be any animation or live footage as shown in Figure 3.13.

Fig. 3.13 Shot is prepared for Compositing Courtesy- Marvel Studio

3.3.5 Matte Painting

Sometimes the background cannot be filmed in the way it was imagined. In such cases matte painting is used to digitally paint the background to look more complex for image and projection map. Figure 3.14 (a) shows the background before matte painting and Figure 3.14 (b) shows the background after matter painting. A 3D model in software looks very different depending on the project and the requirements. The background created can be export and send it to compositor for integration.

Fig.3.14 (a) Before matte painting

Fig.3.14 (b) After matte painting

3.3.6 CGI

3D elements require syncing that is where the CGI department is come. It spreads out further and deeper into more departments like texturing, modeling, rigging, animation, rendering and so on. All of these departments prepare the 3D imagery for compositor and they send it out in different layers as shown in Figure 3.15. Compositor needs to integrate and mix all these layers.

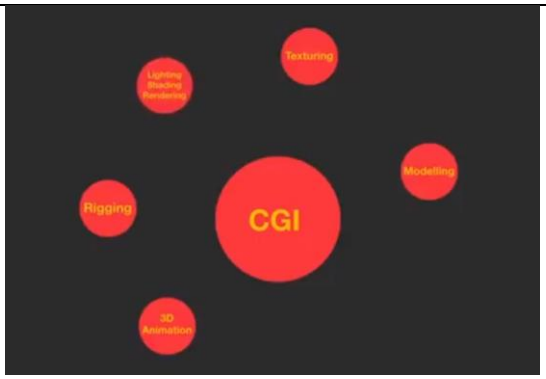


Fig. 3.15 Different CGI Department Courtesy- Author

3.3.7 Motion Tracking

If there's a complex camera motion that involves CGI objects or character or the background then the process also includes the motion tracking. It is accomplished by different departments.

In motion tracking, the motion in live-action shot is tracked and the identical virtual camera is created in 3D software as shown in Figure 3.16. It allows compositor to integrate other elements in synchronization with the motion of the camera.

Fig. 3.16 CGI element is placed in live footage

After the footage is tracked the data is sent to the CGI or matte painting department as shown in Figure 3.17. Concerning department use it to place their created elements in synchronization with the motion of the shot. For example, if an element is a 2D image. If you have to replace a computer screen then the tracking data might be sent directly to the compositor to synchronize it with the motion.

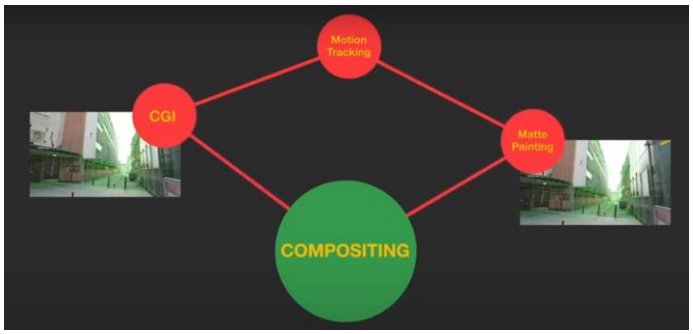


Fig. 3.17 Motion tracking data sent to CGI/Matte painting dept. Courtesy- Author

So, after all those elements are created and sent to the compositor he combines them there. That is the work of the compositor to make it look real as shown in Figure 3.18.

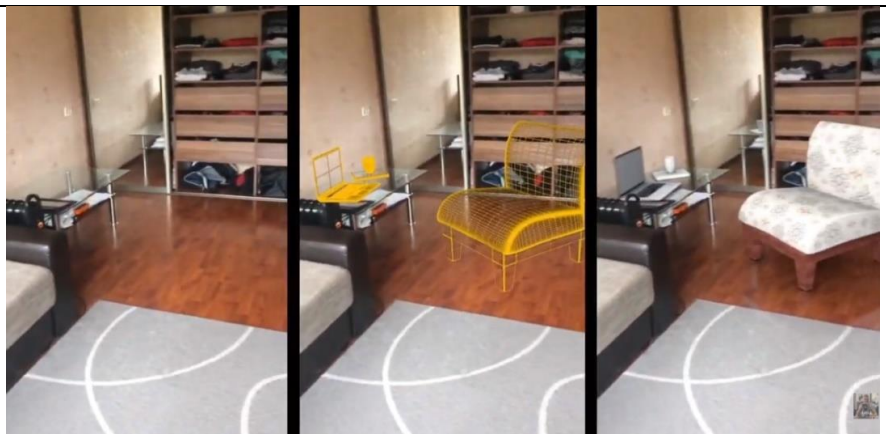


Fig. 3.18 Object is placed using motion tracking data

It is a good idea to watch and study the reality how the light interacts, how camera shoots a scene. It is not just putting the images together. It is the way you combine them. The tricks and skills that you use and make it look real.

3.4 Difference between Compositor and other VFX Artist

When you start out, you are probably not going to work on the big-budget films. You probably will be involved with commercials and small budget films.

Those guys are searching for a person who not only composites but has some additional skills. By saying that you want to become a compositor, you probably mean that you want to become a visual effects artist.

What is the difference between those two?

The compositor combines the images that are created already by the different departments. While the visual effects artist has a variety of skills mentioned in Figure 3.19 including the compositing. Compositing can be under the visual effects artists skills or as a separate profession.

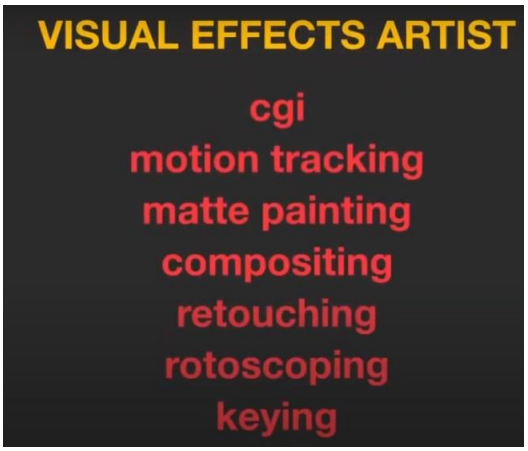


Fig. 3.19 Different Visual Effects Skill Courtesy- Author

3.5 Software for visual effects

The visual effects and animation artist have different work environment. Software used for this work are very costly. So, it is better to choose the right software.

3.5.1 Compositing

For Compositing, the industry standard is considered the Nuke software. However, After Effects is very popular and used broadly as well. Nuke is superior over the After Effects

or the way around their major and minor differences they are the one of them. Table 3.1 shows a comparison between Nuke and After Effects.

Table 3.1 Comparison between Nuke© and After Effect©

	Nuke	**After Effects**
Workflow	Node base	Layer base
Learning level	Hard to learn	Easy to learn
Environment	3D Environment is integrated in software	Does not have 3D environment. Need to use external plugins.
Price	5000- 8000$	20$/month (Standalone unit) 50$/month (All adobe product)
Mostly used by	Cinema project, movies	Broadcast, motion graphic work

There is another software called Fusion by black magic. It is free and also has node-based workflow like Nuke, that is another software used for the compositing. Knowledge and working skills of some more software are required move further visual effects artist. So, let us take an overview of each and see decide the software required for your work.

3.5.2 Keying, Rotoscoping and Retouch

The compositing software is used for green-screen removal (keying) as well as for rotoscoping as shown in Figure 3.20. However, if it gets more complicated there is a software called Mocha Pro. You can buy it as a plugin for software or as a standalone unit as well.

The compositing software is required for retouching. Further a Photoshop software is required to retouch and repaint the environments. Mocha pro is also very helpful for the complex situations of the retouch. Very similar for the matte painting you can do simple fixes in the compositing software and you will need Photoshop as well to paint the background itself.

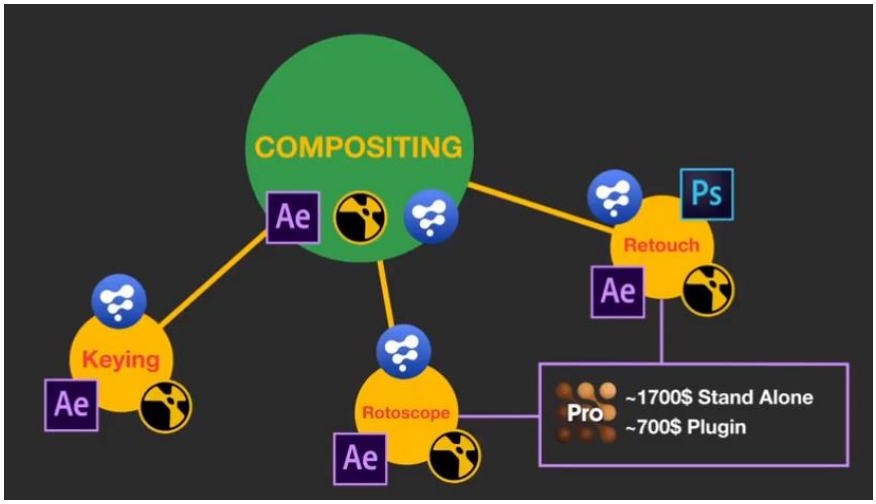


Fig.3.20 Software used in Keying, Rotoscoping and Retouching Courtesy- Author

3.5.3 Matte Painting

Once the shapes are getting more complex you will definitely need a 3D software to make the model. Maya is industry standard software for films, visual effects, video games and 3D animation as shown in Figure 3.21.

3Ds max© is more used for engineering type of modeling, architecture maybe a product or interior design. There is also easy software called cinema 4D©, which is more user friendly than Maya. it is much easier to learn. **Blender** is a free and open source software used to achieve good results. You can use any one from this for matte painting.

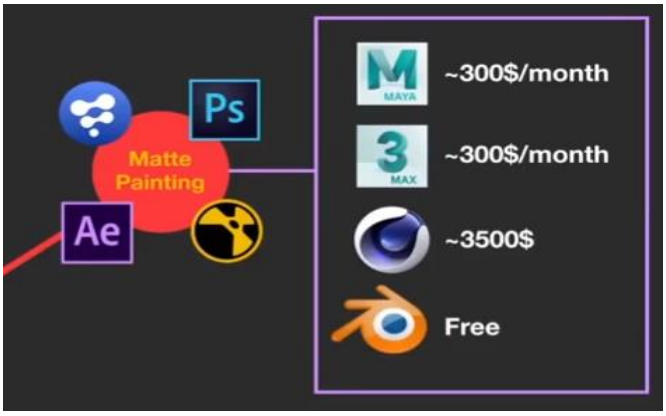


Fig. 3.21 Software used in Matte Painting Courtesy- Author

Table 3.2 Comparison between Maya and 3ds max

	Maya©	**3Ds max©**
Basics	3D animation, modeling, simulation and rendering program.	3D modeling software
3D modeling	Offers the possibility to work on really complex 3D projects.	Perfect for the creation of interior design, and for architectural visualizations.
Animation	Powerful for animation, already used by a lots of professionals.	Comparably Weaker
Rigging	Recommend using Maya, which is better to create complex rigs.	If you are not really experienced, you can use 3ds Max
Rendering	Creates same Result	Creates same Result
Mostly used by	cinema or animation projects, character creation, virtual reality and animations	video game developers, movie pre-visualization, virtual reality experiences, and design visualization

3.5.4 CGI

Mostly 3D software are used for CGI. The examples of most commonly used software for CGI includes, MAYA, 3D Max, Cinema 4D, Blender as shown in Figure 3.22.

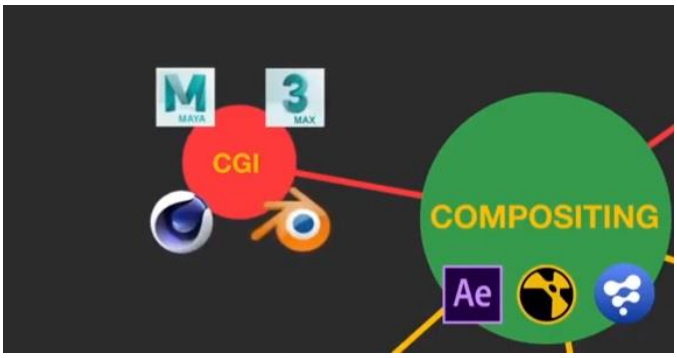


Fig.3.22 Software used in CGI Courtesy- Author

Table 3.3 Comparison between Maya and Cinema 4D

	Maya©	**Cinema 4D©**
basics	Maya is 3D simulation, modeling, animation and rendering software.	Cinema 4D is a 3D modeling, animation, and rendering software.
Developed by	Autodesk	Maxon
Interface and features	Maya's interface is hard to master	Cinema 4D relies on a hand-on interface
Animation & Visual Effects	Maya is excellent with tasks that involve character rigging and animation superimposing.	Easy to learn in motion graphic and faster than 3DS Max.
Mostly used in	Film and Video game industry	TV commercial and advertising creation

3.5.5 Digital effects

Fire explosions, fluid simulations, destruction and much more can be achieved with 3d software's that we have mentioned before, which allow achieving good results. You can also use an external plugins for the compositing or 3d software as shown in Figure 3.23. There is popular software that specializes in digital effects known as Houdini.

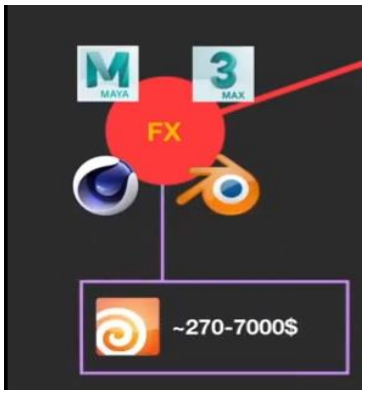


Fig.3.23 Software used in FX Courtesy- Author

3.5.6 Tracking

The compositing software does contain tracking, which might be enough for you. But if the scene becomes more complex you might need external software. (Figure 3.24.) There is one of them is Boujou the most expensive one it's around 4,800$ but it's a good software then there is Syntheyes which has got a very good manual tracking, but it's not really user friendly. PF track is around 1700$ dollars and it is an old base which is close to the way nuke works. Then this mocha Pro which I mentioned before instead of 2D or 3D tracking **mocha Pro** uses planar tracker which is very helpful in extra complex situations.

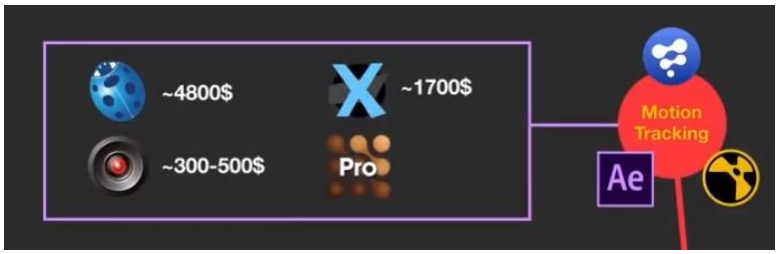


Fig. 3.24 Software used in Motion Tracking Courtesy- Author

Choose the one you like play with that. See for yourself which one do you like more.

Assignment 1. Identify the software from its logo given below.

Software Logo	
Software Name	

3.6 The career growth in VFX

As mentioned in introduction, you can start your career as a roto-artist in VFX field. Then after gaining experience you can choose the department you wish to go like Matte Painting, CGI, Compositing and many more. After year of experience you can become VFX supervisor.

Summary

- CGI means any three dimensional object that you see on screen. It is computer generated graphics.
- SFX is created on sets while FX is a digital effect.
- A Compositor is connected with Keying, Rotoscoping, Retouching, matte painting, motion tracking and CGI department.
- Matte painter digitally paints the background.
- CGI department have various sub-department such as Modeling, Texturing, Lighting/Shading, Rigging, 3D animation and Rendering.
- Motion Tracking enables you to put 3D object into the live action shots.
- Nuke, After Effects and Mocha Pro software is used for compositing, Keying, Retouch and Rotoscoping.
- MAYA, 3D Max, Cinema 4D and Blender are used to create CGI and FX.

CHECK YOUR PROGRESS

A. Multiple Choice Questions

1. CGI stands for (a) Common Graphics Imagery (b) Computer Generated Imagery (c) Computer Graphics Imagery (d) Compound Graphic Imagery
2. CGI includes anything that is in (a) 2D (b) 3D (c) 2.5D (d) Motion graphics
3. VFX means (a) Video Effect (b) Video Effects (c) Visual Effect (d) Visual Effects
4. Any Explosions and live effect created on set is known as (a) DX (b) FX (c) SFX (d) VFX
5. Special effect which is made on set, is directly connected with (a) CGI (b) VFX (c) DX (d) SFX
6. Which element is not included in compositing (a) Live Characters (b) Motion Graphics (c) 3D Character (d) Transition
7. Prep/Paint department does not include (a) Keying (b) Rotoscoping (c) Retouch (d) Modeling

8. CGI department spreads out in ___ departments (a) Four (b) Five (c) Six (d) Seven
9. Nuke is not used in (a) Compositing (b) Rotoscoping (c) Retouching (d) Editing
10. 3Ds max is (a) 3D Modeling software (b) Motion graphics software (c) Compositing Software (d) Editing software

B. Fill in the blanks

1. CGI does not include _____ shot.
2. Digital effects (FX) can be used in_____ like a 3D video game.
3. If a person knows how to integrate an element into the footage, he can be _____ artist.
4. Prep/Paint means cleaning out the shots and preparing the footage for the _____.
5. Motion tracking allows compositor to integrate other elements in synchronization with the motion of the _____.
6. After Effects is a_____ base software.
7. Cinema 4D is a 3D modeling, animation, and_____ software.

C. True or False

1. Fire and Explosion, which is created by computer is called as Digital effects.
2. Digital effect can be used in visual effects in form of 3D character.
3. Visual effects artist should have CGI skills. But CGI artist does not need Digital effects skills.
4. If there's a green screen that needs to be removed, then the shot first is being sent to the Rotoscoping Department.
5. Modeling, rigging and rendering comes under CGI department.
6. Nuke is mostly used in motion graphics work.
7. 3Ds max is more used for engineering type of modeling, architecture or interior design.
8. The Compositing software does not contain tracking.

D. Short answer questions

1. What is difference between CGI and VFX?
2. What is difference between SFX and FX?
3. What is connection between FX and CGI?
4. Write the skill connection between VFX, CGI and FX.
5. What is Prep/Paint?
6. What is matte painting?
7. Write the name of different department included in CGI.
8. Write the difference between compositor and other VFX department.
9. Compare Maya and 3Ds max.
10. What is the career growth in VFX field?

Further References for Practical's/reading

Text Books:

Benjamin Bratt. (2011). Rotoscoping Techniques and Tools for the Aspiring Artist. Elsevier Inc.

Steve Wright.(2011).Compositing Visual Effects: Essentials for the Aspiring Artist. Elsevier Inc.

Jeffrey A.Okun, Susan Zwerman (Eds.).(2020).The VES Handbook of Visual Effects. Routledge

Digital Resources:

Text Materials

Intro to rotoscoping

https://kristen-gillette-crnt.squarespace.com/animation-rotoscope

Animate reality with rotoscoping.

https://www.adobe.com/in/creativecloud/video/discover/rotoscoping-animation.html

The Art of Roto

https://www.fxguide.com/fxfeatured/the-art-of-roto-2011/

Silhouette-v7.5-UserGuide

https://cdn.borisfx.com/borisfx/store/silhouette-7-5/Silhouette-v7.5-UserGuide.pdf

Online Videos

SilhouetteFX video tutorial

https://borisfx.com/videos/?tags=product:Silhouette&search=

https://www.youtube.com/channel/UC7MqpMLZgeZxrlricwcFTUQ

How to do Hair Roto - Silhouette FX Rotoscopy Tutorial

https://youtu.be/qptclxM12nY

Motion blur and vfx roto In Silhouette

https://youtu.be/zYR-rFD94KY

Glossary

Alpha Matte – It creates the matte using alpha channel.

Bit Depth – It refers to the color information stored in an image. The higher the bit depth of an image, the more colors it can store. For example, a 1 bit image can only show two colors, black and white Because the 1 bit can only store one of two values, 0 (white) and 1 (black). An 8 bit image can store 256 possible colors.

Chroma Key – It is a compositing technique to use a specific colour like blue, green to remove background.

Compositing – Combining different layers and object in to a single video or film frame.

Depth Map – A depth map is just a representation of the distance from a reference point to your image. In terms of perspective, it provides in-depth detail of how near and far a part of the image is. These maps can be converted into a gray scale image where brighter pixels correspond to regions that are closer while darker pixels are further away from the reference point.

Depth of Field blur – It describes the amount of sharpness a video frame has, when it focuses on certain point inside the frame. It is affected by the focal length of the lens, aperture and object distance.

Edge Feather – Act of creating soft edge of the shape so that it can gradually mixed with background.

Focus object – The object, that is going to separate from the video footage.

Frame rate - Number of video frames camera captures in one second. It is denoted by FPS, some examples are- 24 FPS, 25FPS, 60 FPS, 12 FPS.

Fringing – To form a border around edge of something.

Grain – Random physical texture made from small metallic silver particles found on processed photographic celluloid. Also known as granularity, this can vary in size, not just due to its random nature, but by the size of the image shrinking or increasing "grains."

Image Sequence – Series of sequential still images that represent frames of an animation or video.

Inorganic Shape – Shape created by the straight or perfectly curving lines, like those found in geometry.

Key Frame – Beginning and end poses for a particular animation sequence are called key frames.

Luma Matte – The matte based on luminance of the layer. It is created from grey-scale images or animations, here white is fully transparent, black is opaque and everything in between is a varying degree of transparency.

Motion blur – It is the blur seen in moving objects in a photograph or a single frame of film or video. It happens because objects cover longer distance over a short numbers of frames.

Multi frame – It allows transform and reshape tool to make adjustment on all previously set of key frames or selection of key frames.

Node - In node base software, It can perform simple image processing operations by connecting together.

Noise – It is the random variation of brightness or color information in images, and is usually an aspect of electronic noise. This can be produced by the image sensor and circuitry of a scanner or digital camera.

Opacity - Transparency of a shape/object determined by 0 to 100. Here Zero means completely transparent and 100 means fully opaque.

Organic Shape – These shapes are often curved in appearance; these are similar to those found in nature, such as plants, animals, and rocks.

Pivot Point – The spot from which a rotation takes place.

Pixel – It is the smallest unit of digital image that is responsible for showing or displaying on digital display device.

Pixel Aspect Ratio- Proportion of individual pixels that creates digital image. Mostly pixels are square that results pixel aspect ratio1:1

Proxy Image – Provides lower quality source image for roto in SilhouetteFX software.

Raster Graphics – Types of images that are produced when scanning or photographing an object. Raster images are compiled using pixels, or tiny dots, containing unique color and tonal information that come together to create the image.

Rendering – Conversion of 3D models into two-dimensional images with 3D effects is called rendering.

Resolution – It refers to number of pixels are displayed per inches of an image. It is denoted by PPI. Higher resolution means more pixels per inches.

Spline – In computer graphic, a spline is a curve that connects two or more specific points, or that is defined by two or more points.

Stabilization – Algorithms used to improve video quality by removing unwanted camera shakes and jitters due to hand jiggling and unintentional camera panning.

Standout Hair – Strands of hair that is not included in basic shapes.

Stereo 3D – It uses the disparity of two camera images viewing the same scene to calculate depth information, just like the human eye.

Stereo Roto – In stereo conversion, roto is being used to separate elements from a two dimensional shot sequence to create a depth map that will allow a second 'virtual' camera to be produced with the correct offset for stereo parallax.

Tangent – Controlling handles in spline tools.

Track matte – It is a still image, video clip, graphic, piece of text or shape used to create variable transparency in another layer. With a track matte, you create a top layer that provides alpha, or luminance and a bottom layers that contains imaginary.

Viewer – In Silhouette software, length of frames is viewed, playback and shapes are manipulated in this panel.

Video Format – Type of file format used to storing digital video data on computer system.

Warp Stabilizer – Digital Video Effect used to stabilize the shaky video footage.

Zoom in/out – To make the image of something or someone appear much larger and nearer, or much smaller and further away by using camera or computer graphics software.

Answer

Module 1. Drawing and Animating Roto shapes

Session 1. Rotoscoping Pre-Requisite

A. Multiple Choice Questions

1. (d) 2.(c) 3.(c) 4.(d) 5.(a) 6.(d) 7.(c) 8.(c) 9.(c) 10.(c)

B. Fill in the Blanks

(1) Time and patience (2) Visible, Invisible (3) Warp Stabilizer (4) Final use of the matte (5) Form and Motion (6) Perfection (7) Single shape (8) Multiple shapes (9) Shape (10) Starting, End

C. State True or False

1.(T) 2. (T) 3. (T) 4. (F) 5. (T)

Session 2. Working with Silhouette

A. Multiple Choice Questions

1. (c) 2.(c) 3.(d) 4.(a) 5.(d) 6.(c) 7.(b) 8.(b) 9.(a) 10.(d)

B. Fill in the Blanks

(1) Toolbars, Pop-up menus (2) Image sequence (3) Session (4) Silhouette (5) Mask (6) Node parameter (7) Combine, Delete (8) Enter (9) Crops (10) Playback

C. True or False

1.(F) 2.(T) 3.(F) 4.(T) 5.(T) 6.(T) 7.(F) 8.(T) 9.(F) 10.(T)

Session 3. Drawing Shapes

A. Multiple Choice Question

1. (b) 2.(c) 3.(b) 4.(c) 5.(c) 6.(b) 7.(d) 8.(a) 9.(c) 10.(c)

B. Fill in the Blanks

(1) Curve (2) Smooth points (3) Curve (4) Reshape (5) Move more (6) Feather handle (7) Outward (8) X (10) Multiple (11) AA

C. True or False

1.(F) 2.(T) 3.(T) 4.(F) 5.(T) 6.(F) 7.(T) 8.(F) 9.(F) 10.(T)

Session 4. Animating Shapes

A. Multiple Choice Question

1.(b) 2.(d) 3.(a) 4.(b) 5.(a) 6.(d) 7.(d) 8.(c) 9.(b)

B. Fill in the Blanks

(1) Move individual point (2) TT (3) Small portion of the shape (4) Reshape tool (5) Size of the shape (6) Ctrl key (7) Scales (8) E (9) Set interval (10) Incremental key frame

C. True or False

1.(F) 2.(F) 3.(T) 4.(T) 5.(T) 6.(T)

Module 2. Roto Techniques in SilhouetteFX

Session 1. Blur and Motion Blur

A. Multiple Choice Questions

1.(a) 2.(b) 3.(b) 4.(a) 5.(b) 6.(b)

B. Fill in the Blanks

(1) Same (2) Higher (3) Motion or camera (4) Blur (5) Inner side (6) 50% (7) AA (8) Colour comp

C. True or False

1. (T) 2.(F) 3.(T) 4.(F) 5.(T)

Session 2. Motion Tracking

A. Multiple Choice Questions

1.(c) 2.(a) 3.(b) 4.(d) 5.(c) 6.(d) 7.(a) 8.(c) 9.(d)

B. Fill in the Blanks

(1) Tracking (2) Stabilize (3) 2D (4) Foreground (5) Search region (6) Details (7) Perspective (8) Object list

C. State True or False

1. (F) 2.(T) 3.(F) 4.(T) 5.(T)

Session 3. Human Figure based Rotoscoping

A. Multiple Choice Questions

1. (d) 2.(a) 3.(b) 4.(b) 5.(c) 6.(d) 7.(c) 8.(b) 9.(a)

B. Fill in the Blanks

(1) Movement (2) Middle (3) Joint (4) Shoulder (5) Control Point (6) Object list (7) Pivot Point (8) Recalculate

C. True or False

1. (T) 2. (F) 3. (T) 4. (F) 5. (T) 6(T)

Session 4. Rotoscopy of Hair

A. Multiple Choice Questions

1.(c) 2.(b) 3.(c) 4.(d) 5.(a) 6.(c) 7.(c) 8.(c) 9.(d) 10.(c)

B. Fill in the Blanks

(1) Basic Shape (2) Compositor (3) Object window (4) Majority of time (6) Thickness of the stroke (7) Single hair (8) Root

C. True or False

1.(F) 2.(F) 3.(F) 4.(F) 5.(T)

Module 3. Advanced Roto Techniques and Applications

Session 1. Useful Nodes of Silhouette

A. Multiple Choice Questions

1. (a) 2.(c) 3.(d) 4.(a) 5.(c) 6.(d) 7.(d) 8.(b)

B. Fill in the Blanks

(1) Open (2) Black (3) Estimation (4) Foreground and Background (5) Object (6) Foreground

C. True or False

1. (F) 2. (T) 3. (F) 4. (T) 5. (T)

Session 2. Scene Salvage

A. Multiple Choice Questions

1.(d) 2.(a) 3.(a) 4.(d) 5.(b) 6.(a) 7.(b) 8.(c) 9.(c) 10.(d)

B. Fill in the Blanks

(1) Wire (2) Clone tool (3) Moving, Steady (4) Facial blemishes (5) Square (6) Profile Tab (7) Clone Tool (8) Frame number (9) Target (10) Colour correction control

C. True or False

1.(F) 2.(T) 3.(T) 4.(F) 5.(T)

Session 3. Stereo Roto

A. Multiple Choice Questions

1. (c) 2.(d) 3.(c) 4.(c) 5.(b) 6.(a) 7.(b) 8.(b)

B. Fill in the Blanks

(1) Digitized (2) High Quality, Economical (3) Human Visual System (4) Slightly Different (5) Depth (6) Watching 3D Movie

C. True or False

1.(T) 2.(F) 3.(T) 4.(F) 5.(F)

Module 4. Finalizing Matte

Session 1. Finishing the Rotoscoping

A. Multiple Choice Questions

1. (c) 2.(a) 3.(b) 4.(c) 5.(b) 6.(c) 7.(d)

B. Fill in the Blanks

(1) Playback (2) Key frame (3) All previously set key frame (4) Multiple (5)Zero

C. True or False

1. (F) 2.(T) 3.(T)

Session 2. Rendering and Exporting Shapes

A. Multiple Choice Questions

1. (d) 2.(c) 3.(b) 4.(d) 5.(d) 6.(c)

B. Fill in the Blanks

(1) Render (2) Object List (3) .fxs (4) Mask (5) Channels

C. True or False

1. (T) 2. (F) 3. (T) 4.(F) 5.(T)

Session 3. Rotoscoping Work Environment

A. Multiple Choice Questions

1. (b) 2.(b) 3.(d) 4.(c) 5.(a) 6.(d) 7.(d) 8.(b) 9.(d) 10.(a)

B. Fill in the Blanks

(1) Live action shot (2) CGI (3) Visual Effects Artist (4) Compositor (5) Camera (6) Layer (7) Rendering

C. True or False

1. (T) 2. (F) 3. (T) 4. (F) 5. (T) 6. (F) 7. (T) 8. (F)