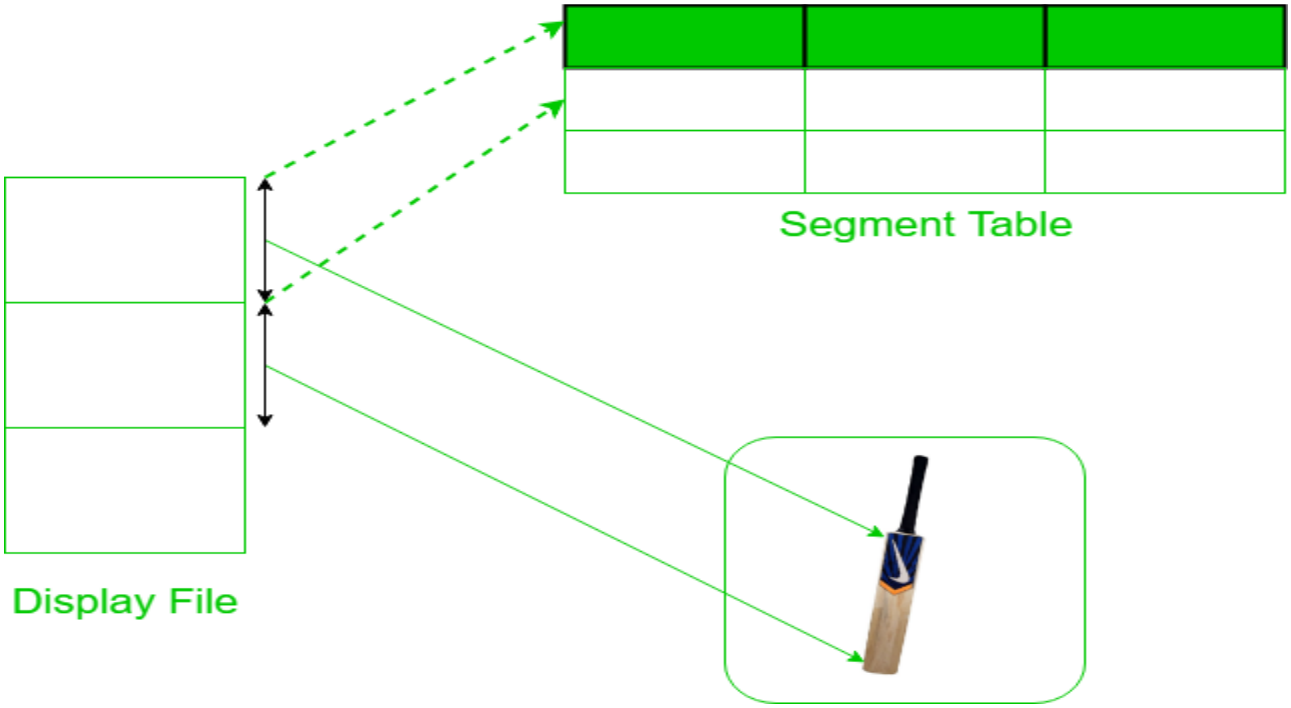
Unit :6

Introduction to animation and gaming

Segments in Computer Graphics:

- To view an entire image or a part of image with various attributes, we need to organize
- image information in a particular manner since existing structure of display file does not satisfy our requirements of viewing an image.
- To achieve this display, file is divided into **Segments**. Each segment corresponds to a component and is associated with a set of attributes and image transformation parameters like scaling, rotation.
- Presence of Segment allows :

1. Subdivision of picture.
2. Visualization of particular part of picture.
3. Scaling, rotation and translation of picture.



Types of Segments :

- **Posted Segment :** When visible attribute of segment is set to 1, it is called Posted segment. This is included in active segment list.
- **Unposted Segment :** When visible attribute of segment is set to 0, it is called Unposted segment. This is not included in active segment list.

Functions for Segmenting the display :

1. **Segment Creation :**
    - Segment must be created or opened when no other segment is open, since two segments can't be opened at the same time because it's difficult to assign drawing instruction to particular segment.
    - The segment created must be given a name to identify it which must be a **valid** one and there should be no segment with the same name.
    - After this, we initialize items in segment table under our segment name and the first instruction of this segment is allocated at next free storage in display file and attributes of segments are initialized to default.

Algorithm:

1. If any segment is open, give error message : "Segment is still open" and go to step 8.
2. Read the name of the new segment.
3. If the segment name is not valid, give error message : "Segment name not a valid name" and go to step 8.
4. If given segment name already exists, give error message : "Segment name already exists in name list" and go to step 8.
5. Make next free storage area in display file as start of new segment.
6. Initialize size of new segment to 0 and all its attributes to their default values.

7. Inform that the new segment is now open.
8. Stop.

Closing a Segment :

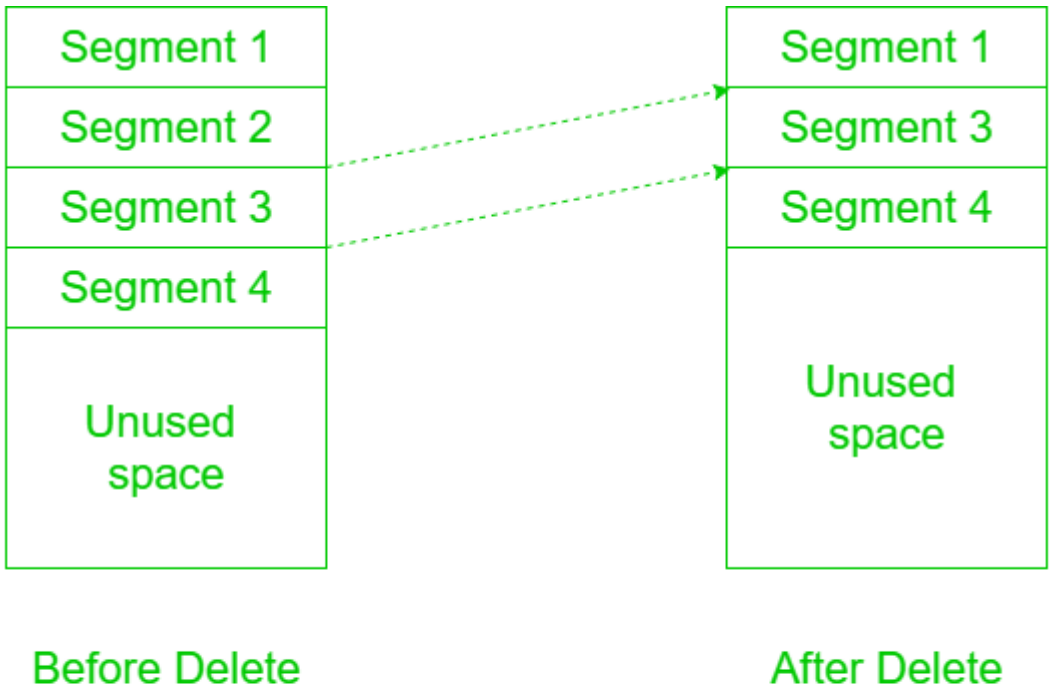
- After completing entry of all display file instructions, the segment needs to be closed for which it has to be renamed, which is done by changing the name of currently open segment as 0.
- Now the segment with name 0 is open i.e. unnamed segment is open and if two unnamed segments are present in display file one needs to be deleted.

Algorithm :

1. If any segment is not open, give error message : "No segment is open now" and go to step 6.
2. Change the name of currently opened segment to any unnamed segment, lets say 0.
3. Delete any other unnamed segment instruction which may have been saved and initialize above unnamed segment with no instructions.
4. Make the next free storage area available in display file as start of the unnamed segment.
5. Initialize size of unnamed segment to 0.
6. Stop.

Deleting a Segment :

- To delete a particular segment from display file, we must just delete that one segment without destroying or reforming the entire display and recover space occupied by this segment.
- Use this space for some other segment.
- The method to achieve this depends upon the data structure used to represent display file.
- In case of arrays, the gap left by deleted segment is filled by shifting up all the segments following it.



Display file contents before and after deleting Segment 2

Algorithm :

- Read the name of the segment to be deleted.
- If segment name is not valid, give error message : “Segment name is not a valid name” and go to step 8.
- If the segment is open, give error message : “Can’t delete an open segment” and go to step 8.
- If size of segment is less than 0, no processing is required and go to step 8.
- The segments which follow the deleted segment are shifted by its size.
- Recover deleted space by resetting index of next free instruction.
- The starting position of shifted segments is adjusted by subtracting the size of deleted segment from it.

- Stop.

7. **Renaming a Segment :**
    - This is done to achieve Double Buffering i.e. the idea of storing two images, one to show and other to create, alter and for animation.

      Algorithm :

- If both old and new segment names are not valid, give error message : “Segment names are not valid names” and go to step 6.
- If any of two segments is open, give error message : “Segments are still open” and go to step 6.
- If new segment name given already exists in the display list, give error message : “Segment name already exists” and go to step 6.
- The old segment table entry are copied into new position.
- Delete the old segment.
- Stop.

Advantages of using segmented display :

- Segmentation allows to organize display files in sub-picture structure.
- It allows to apply different set of attributes to different portions of image.
- It makes it easier to the picture by changing/replacing segments.
- It allows application of transformation on selective portions of image.

Animation:

- Animation refers to the movement on the screen of the display device created by displaying a sequence of still images.

- Animation is the technique of designing, drawing, making layouts and preparation of photographic series which are integrated into the multimedia and gaming products.
- Animation connects the exploitation and management of still images to generate the illusion of movement.
- A person who creates animations is called animator.
- He/she use various computer technologies to capture the pictures and then to animate these in the desired sequence.
- Animation includes all the visual changes on the screen of display devices.
- These are:

1. Change of shape as shown in fig:

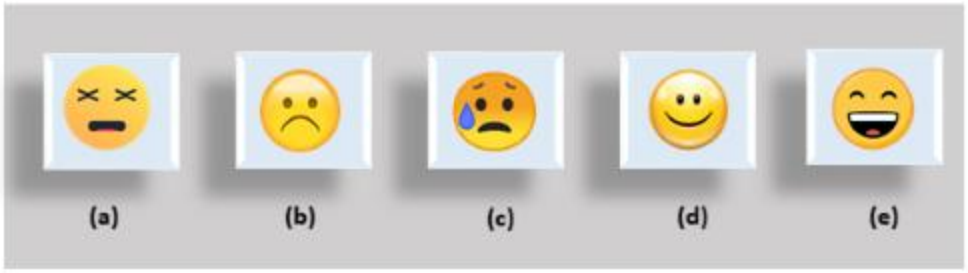


Fig: Change in Shape

2. Change in size as shown in fig:

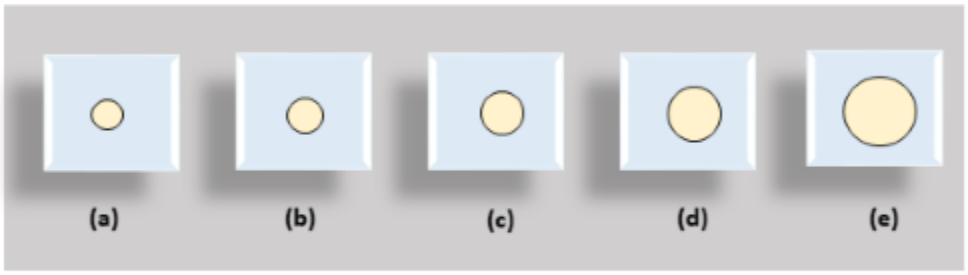


Fig: Change in Size

3. Change in color as shown in fig:

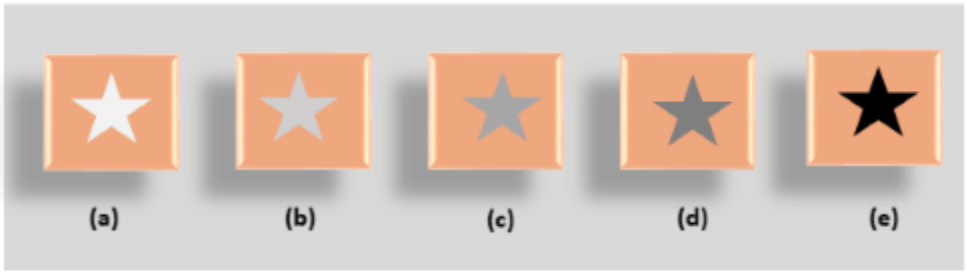


Fig: Change in Color

4. Change in structure as shown in fig:

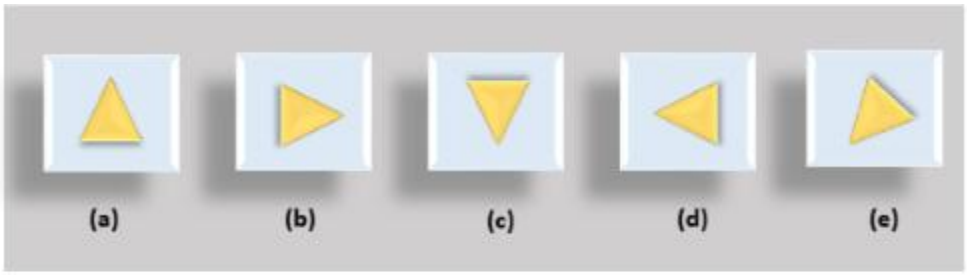


Fig: Change in Structure

5. Change in angle as shown in fig:

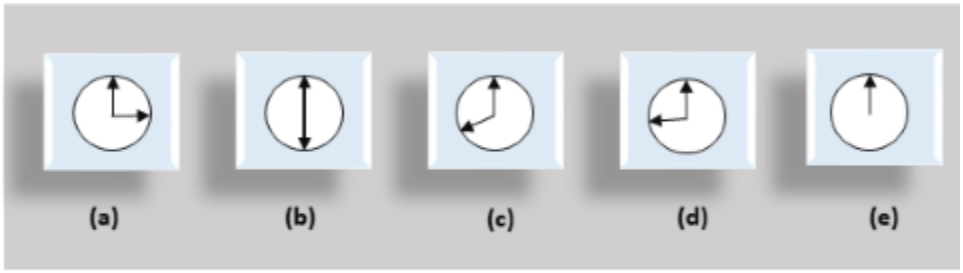


Fig: Change in angle

Application Areas of Animation

1. Education and Training: Animation is used in school, colleges and training centers for education purpose. Flight simulators for aircraft are also animation based.

2. Entertainment: Animation methods are now commonly used in making motion pictures, music videos and television shows, etc.

3. Computer Aided Design (CAD): One of the best applications of computer animation is Computer Aided Design and is generally referred to as CAD. One of the earlier applications of CAD was automobile designing. But now almost all types of designing are done by using CAD application, and without animation, all these work can't be possible.

4. Advertising: This is one of the significant applications of computer animation. The most important advantage of an animated advertisement is that it takes very less space and capture people attention.

5. Presentation: Animated Presentation is the most effective way to represent an idea. It is used to describe financial, statistical, mathematical, scientific & economic data.

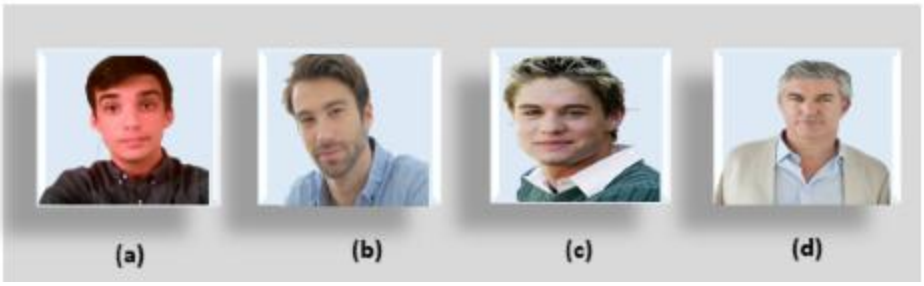
Animation Functions:

1. **Morphing:**
    - Morphing is an animation function which is used to transform object shape from one form to another is called Morphing.
    - It is one of the most complicated transformations.
    - This function is commonly used in movies, cartoons, advertisement, and computer games.

For Example:

1.Human Face is converted into animal face as shown in fig:

2. Face of Young person is converted into aged person as shown in fig:



The process of Morphing involves three steps:

1. In the first step, one initial image and other final image are added to morphing application as shown in fig: Ist & 4th object consider as key frames.
2. The second step involves the selection of key points on both the images for a smooth transition between two images as shown in 2nd object.

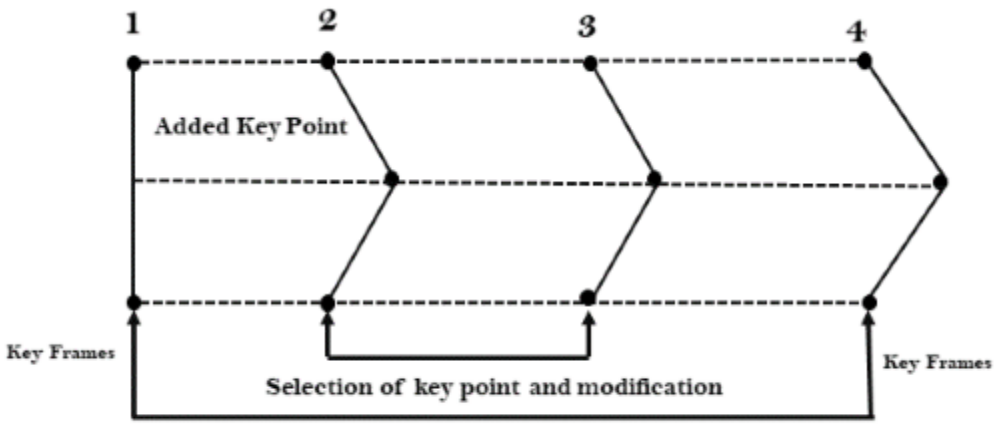


Fig: Process of Morphing

3. In the third step, the key point of the first image transforms to a corresponding key point of the second image as shown in 3rd object of the figure.

2. **Wrapping:** Wrapping function is similar to morphing function. It distorts only the initial images so that it matches with final images and no fade occurs in this function.

3. **Tweening:** Tweening is the short form of 'inbetweening.' Tweening is the process of generating intermediate frames between the initial & last final images. This function is popular in the film industry.

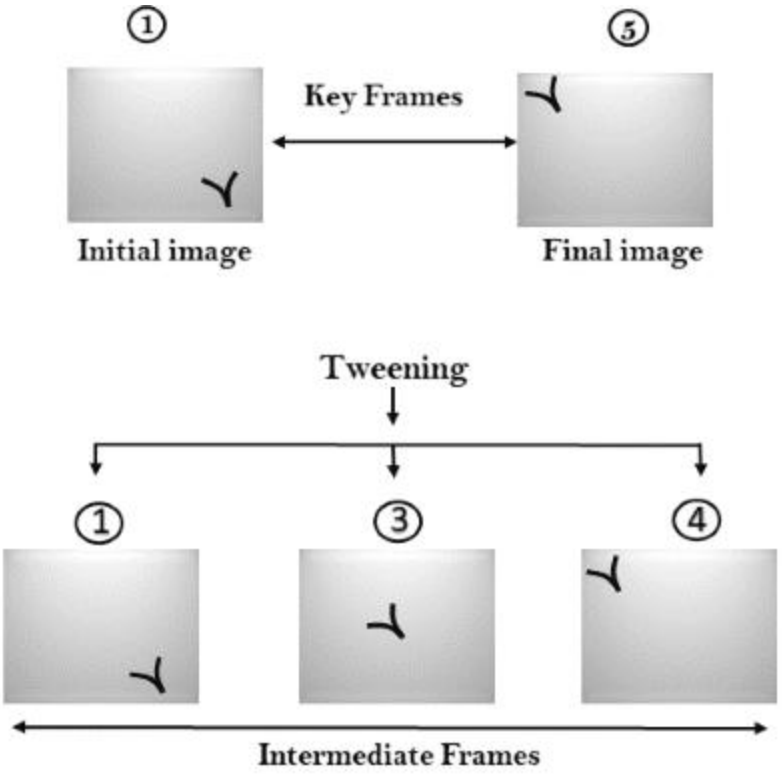


Fig: Tweening

4. **Panning:** Usually Panning refers to rotation of the camera in horizontal Plane. In computer graphics, Panning relates to the movement of fixed size window across the window object in a scene. In which direction the fixed sized window moves, the object appears to move in the opposite direction as shown in fig:

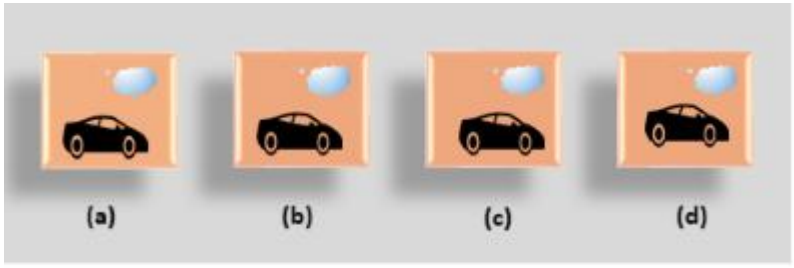


Fig: Panning

If the window moves in a backward direction, then the object appear to move in the forward direction and the window moves in forward direction then the object appear to move in a backward direction.

5. **Zooming:** In zooming, the window is fixed an object and change its size, the object also appear to change in size. When the window is made smaller about a fixed center, the object comes inside the window appear more enlarged. This feature is known as **Zooming In**.

When we increase the size of the window about the fixed center, the object comes inside the window appear small. This feature is known as **Zooming Out**.

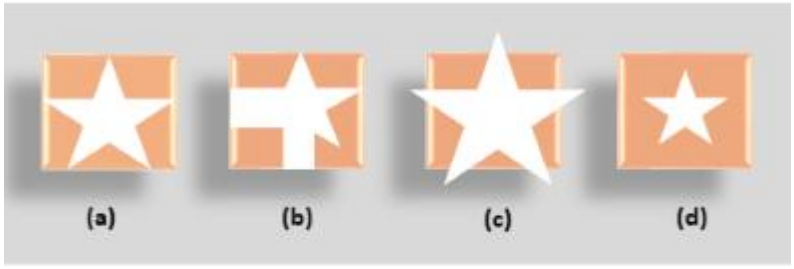


Fig: Zooming in & Zooming Out

6. Fractals: Fractal Function is used to generate a complex picture by using Iteration. Iteration means the repetition of a single formula again & again with slightly different value based on the previous iteration result. These results are displayed on the screen in the form of the display picture.

Gaming:

A variety of computer graphic techniques have been used to display video game content throughout the history of video games. The predominance of individual techniques have evolved over time, primarily due to hardware advances and restrictions such as the processing power of central or graphics processing units.