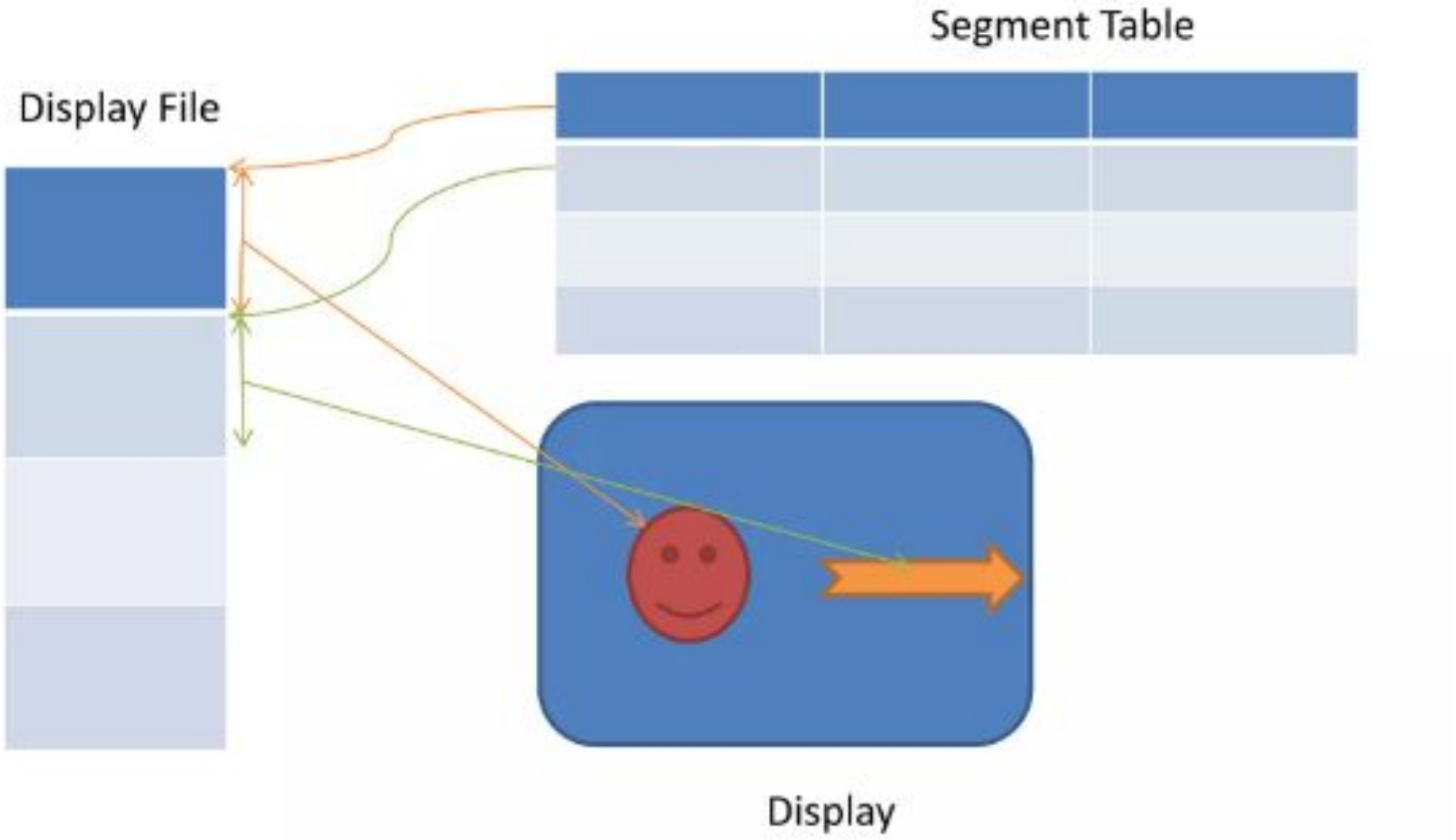
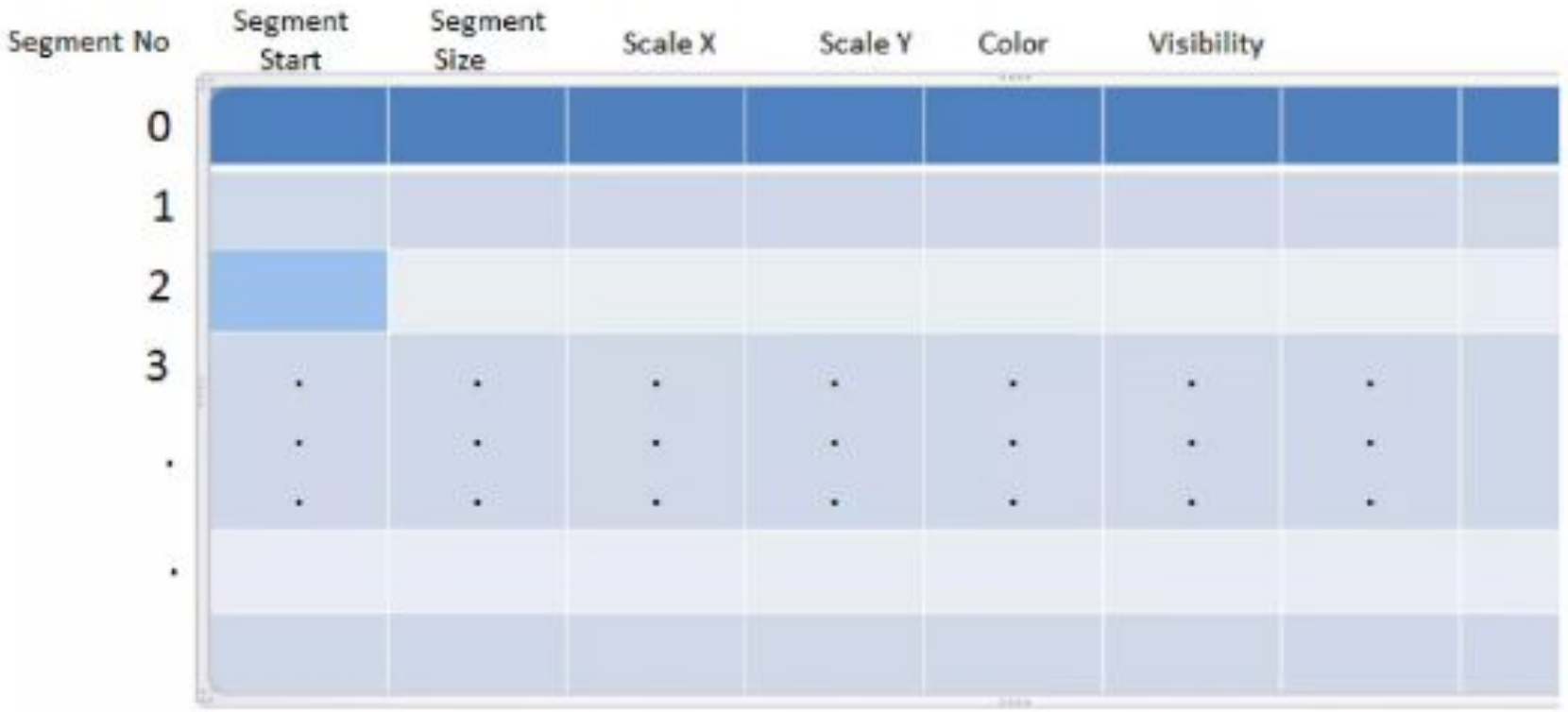
UNIT 5 Introduction to Animation and Gaming

- To humans, an image is not just a random collection of pixels; it is a meaningful arrangement of regions and objects.
- There also exits a variety of images: natural scenes, paintings, etc. Despite the large variations of these images, humans have no problem to interpret them.
- The image information is stored in Display file.
- Existing structure of display file does not satisfy the requirements of viewing image. Display image is modified to reflect the sub picture structure. To achieve this display file is divided into segments.

The Segment table indicates the portion of the display file used to construct the picture



Segment table



Segment Creation

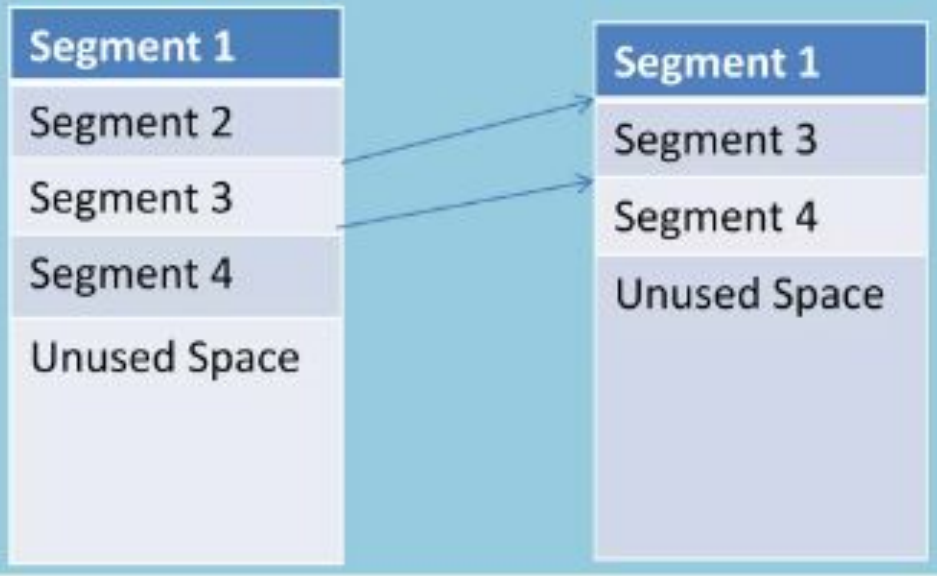
- We Must give the segment name so that we can identify it.
- For example say that there is segment no. 3, then all following MOVE and Line commands would belong to segment 3. We could then close segment 3 and open another.
- First thing to create a segment is to check whether some other segment is open. We can not open two segments at the same time because we would not know to which segment we should assign the drawing instructions. If there is segment open, we have an error
- Next we should select valid segment name and check whether there already exists a segment under this name. If so, we again have an error.
- The first instruction belonging to this segment will be located at the next free storage area in the display file. The current size of the segment is zero since we have not actually entered any instructions into it yet.

Closing a Segment

- Once the drawing instructions are completed, we should close it.
- NOW-OPEN variable indicates the name of the currently open segment.
- To close a segment it is necessary to change the name of the currently open segment. It can be achieved by changing the name of currently open segment as 0.
- We don't have two unnamed segments around because we shall show only one of them and the other would just waist storage.
- If there are two unnamed segments in the display file one has to be deleted.

Deleting A Segment

- When we want to delete a particular segment from the display file then we must recover the storage space occupied by its instructions and make this space free for some other segment. To do this we must not destroy and re-form the entire display file, but we must delete just one segment, while preserving the rest of the display file.
- Here we have used arrays to store the display file information.



Delete Algorithm

1. Read the name of the segment which is to be deleted.
2. Check whether the segment name is valid; if not display error "Segment not valid" go to step 8
3. Check whether the segment is open, if yes, display error message " Can't delete open segment" go to step 8.
4. Check whether the size of segment is greater than 0, if no, no processing is required as segment contains no instructions.
5. Shift the display file elements which follow the segment which is to be deleted by it's size.
6. Recover the deleted space by resetting the index of the next free instruction.
7. Adjust the starting positions of the shifted segments by subtracting the size of the deleted segment from it.
8. Stop.

Renaming a Segment

- The display processor is continuously reading the display file and showing its contents
- Suppose we wish to use this device to show an animated character moving on the display.
- To display a new image in the sequence we have to delete the current segment and re-create it with the altered character. The problem in this process is that during the time after the first image is deleted and time before the second image is completely entered, only a partially completed character is displayed on the screen.
- We avoid this problem by keeping the next image ready in the display file before deleting the current segment.
- Segment which is to be deleted and segment which is to be replaced with must exist in display file at the same time.
- We do this by building the new invisible image under some temporary segment name. When it is completed, we can delete the original image, make the replacement image visible, and rename the new segment to become the old segment to achieve apparent motion.
- The idea of maintaining two images, one to show and one to build or alter, is called ***double buffering.***

1. Change of shape as shown in fig:

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:

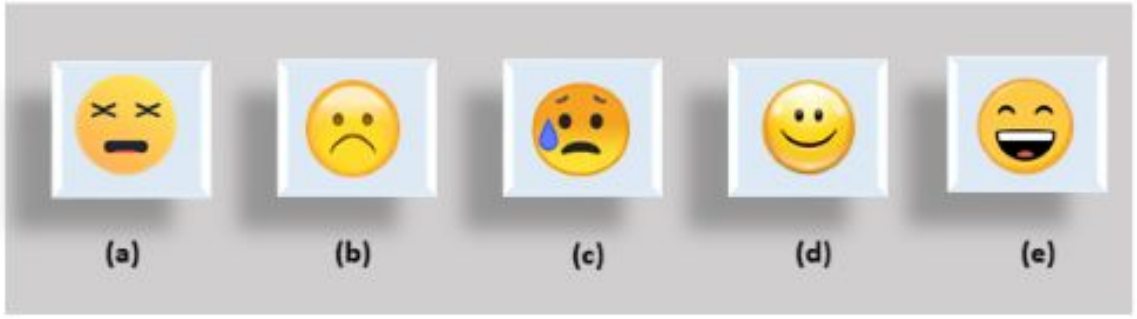


Fig: Change in Shape

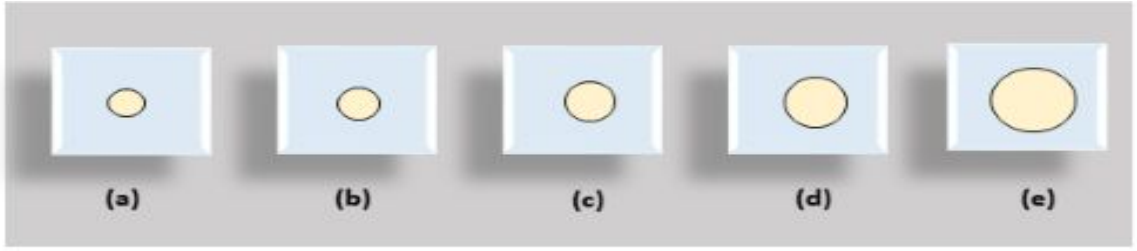


Fig: Change in Size

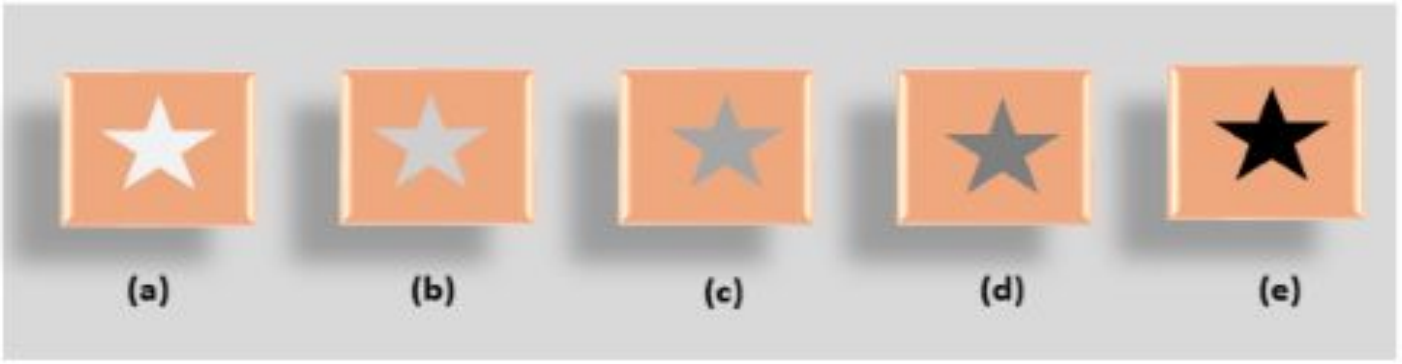


Fig: Change in Color

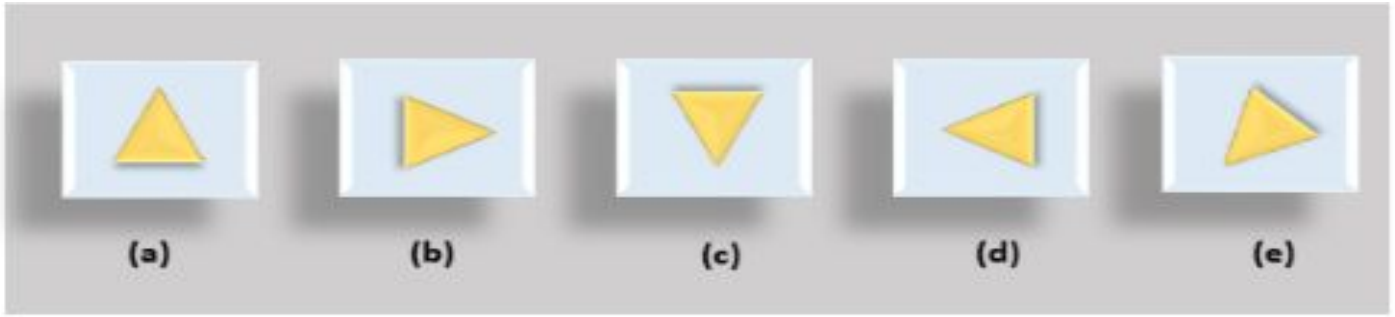


Fig: Change in Structure

Conventional Animation

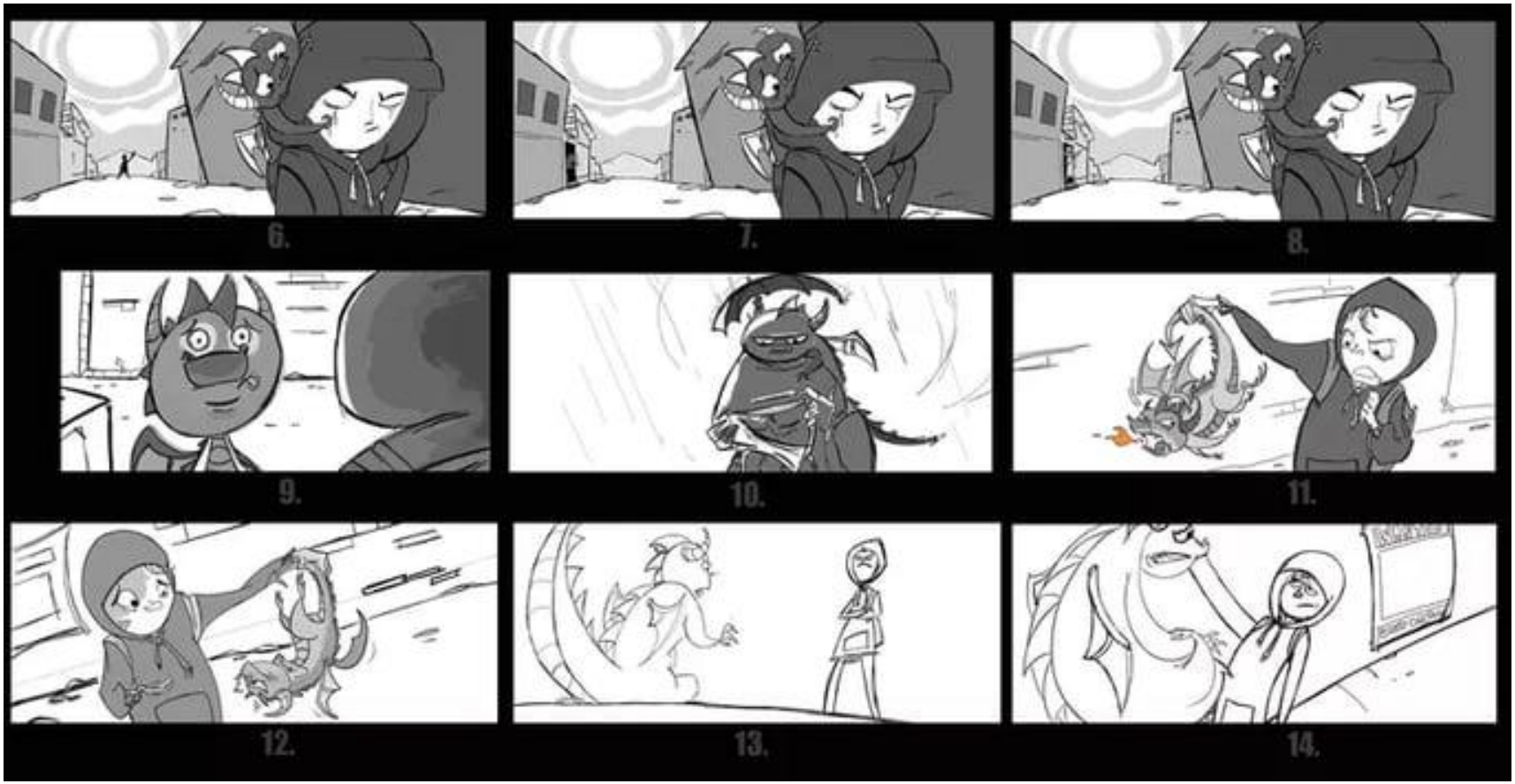
Conventional Animation is graphics designed by hand.
To make animation the artist have to go through the steps

1. Story Board
2. Key frames
3. In Between
4. Pencil Test
5. Cels
6. Route sheets

Example of conventional animation
https://www.youtube.com/watch?v=sEVpPYD306k

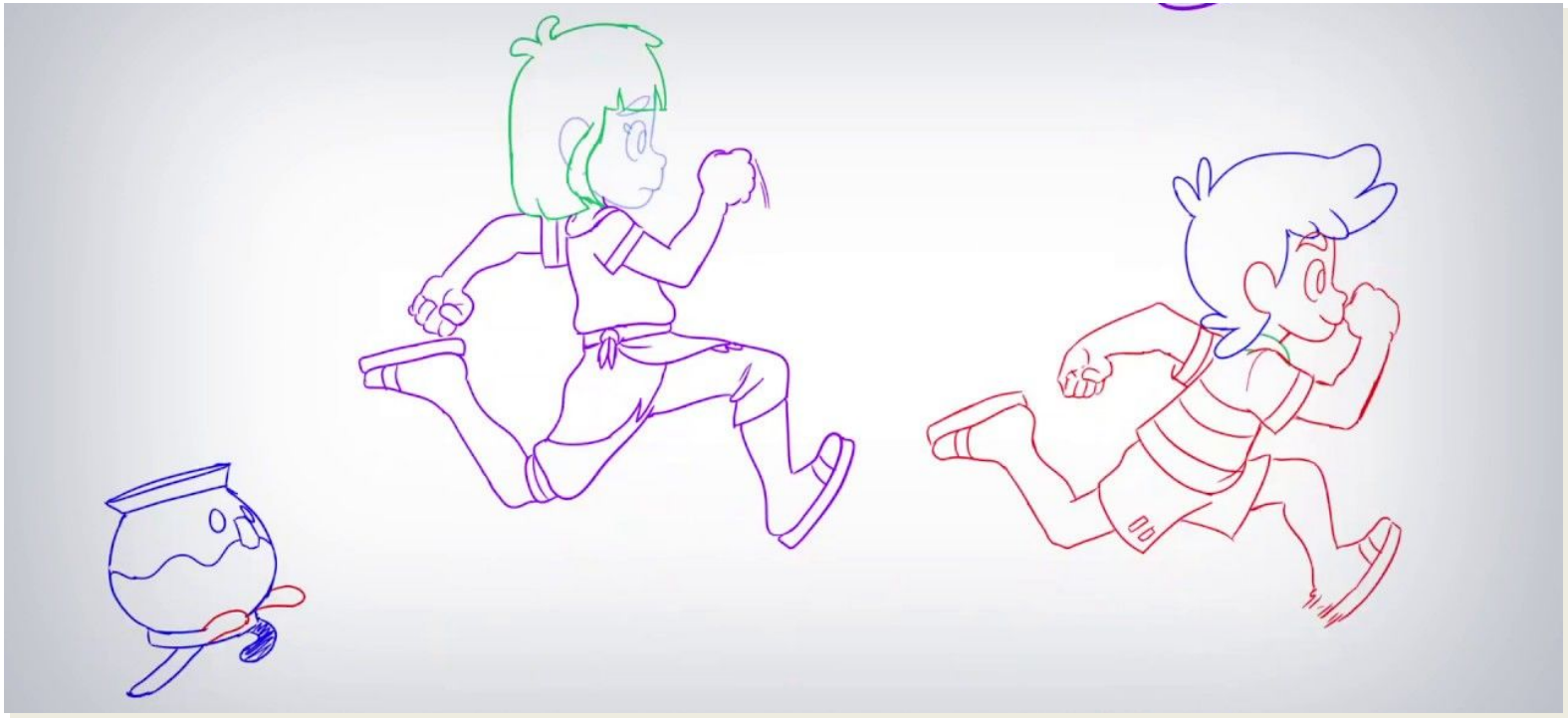
1. Story Board

With the help of sequence of sketches the ideas and of structure animation is created. This outline form of animation is called story board



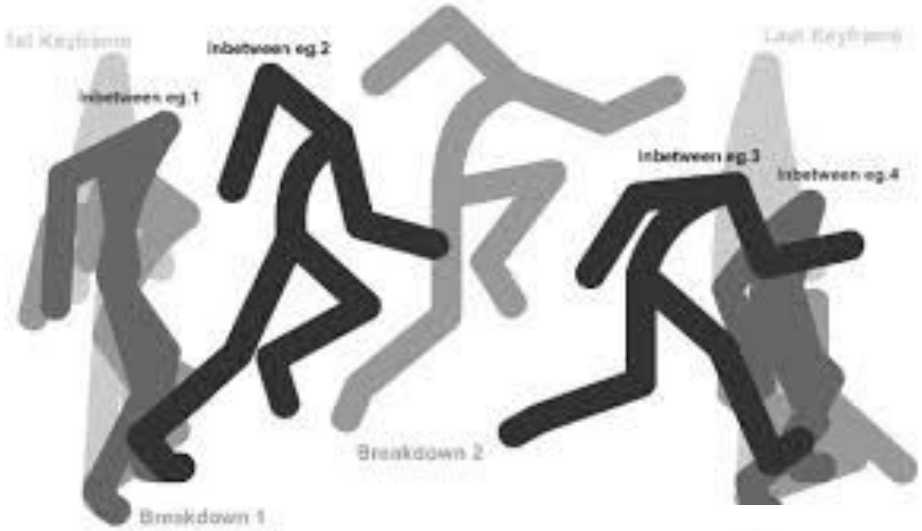
2. Key frames

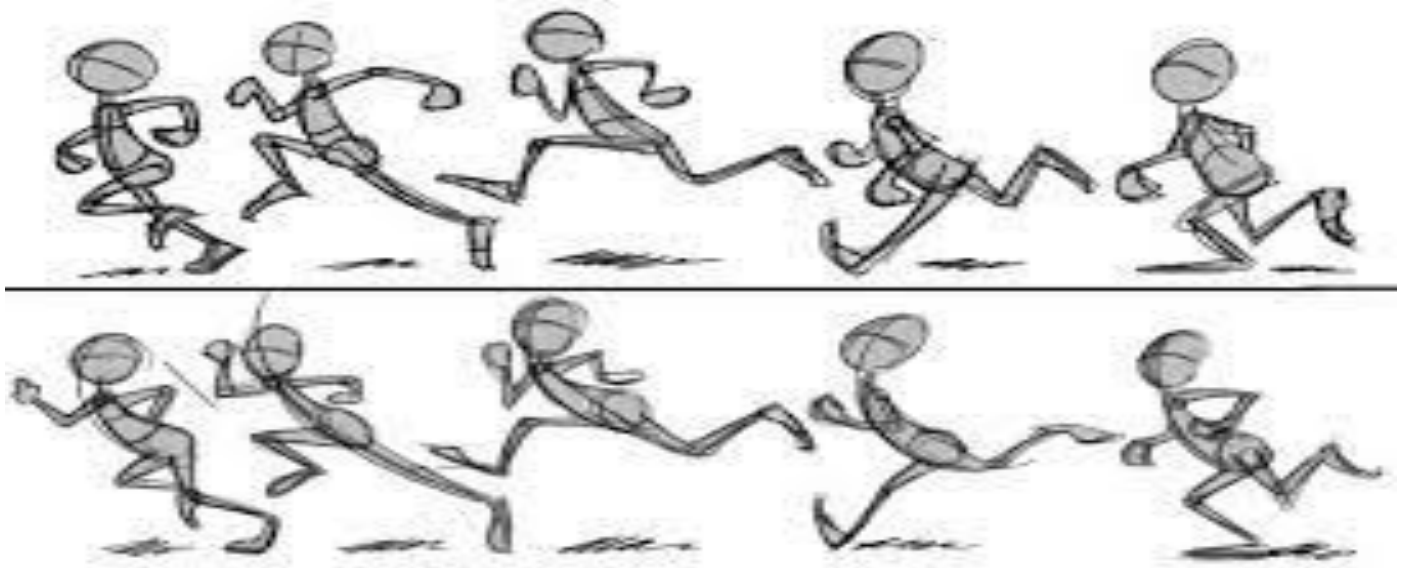
Once are the frames in animation in which the entities being animated are at extreme position.



3. In Between

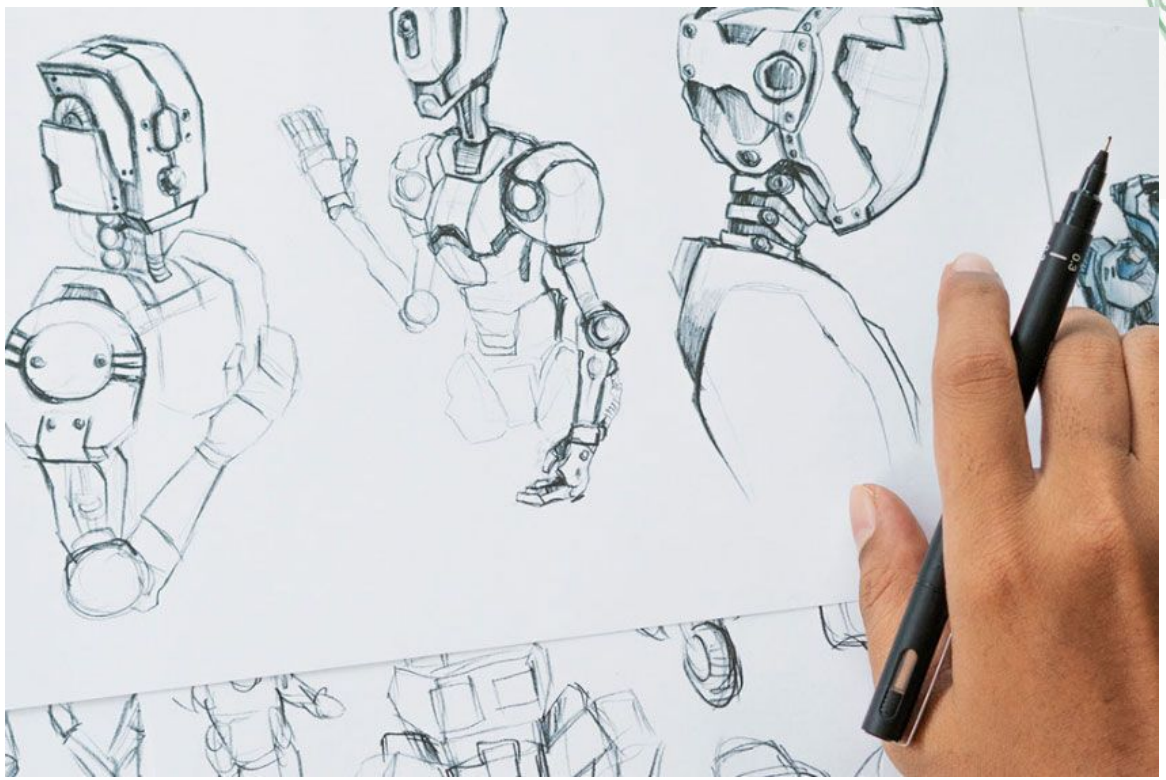
After frames is decided the intermediate positions of object is in between. Filled the intermediate frames in key frames is called in between





4. Pencil Test

With the key frames and In between trial films is made which is called pencil test



5. Cels

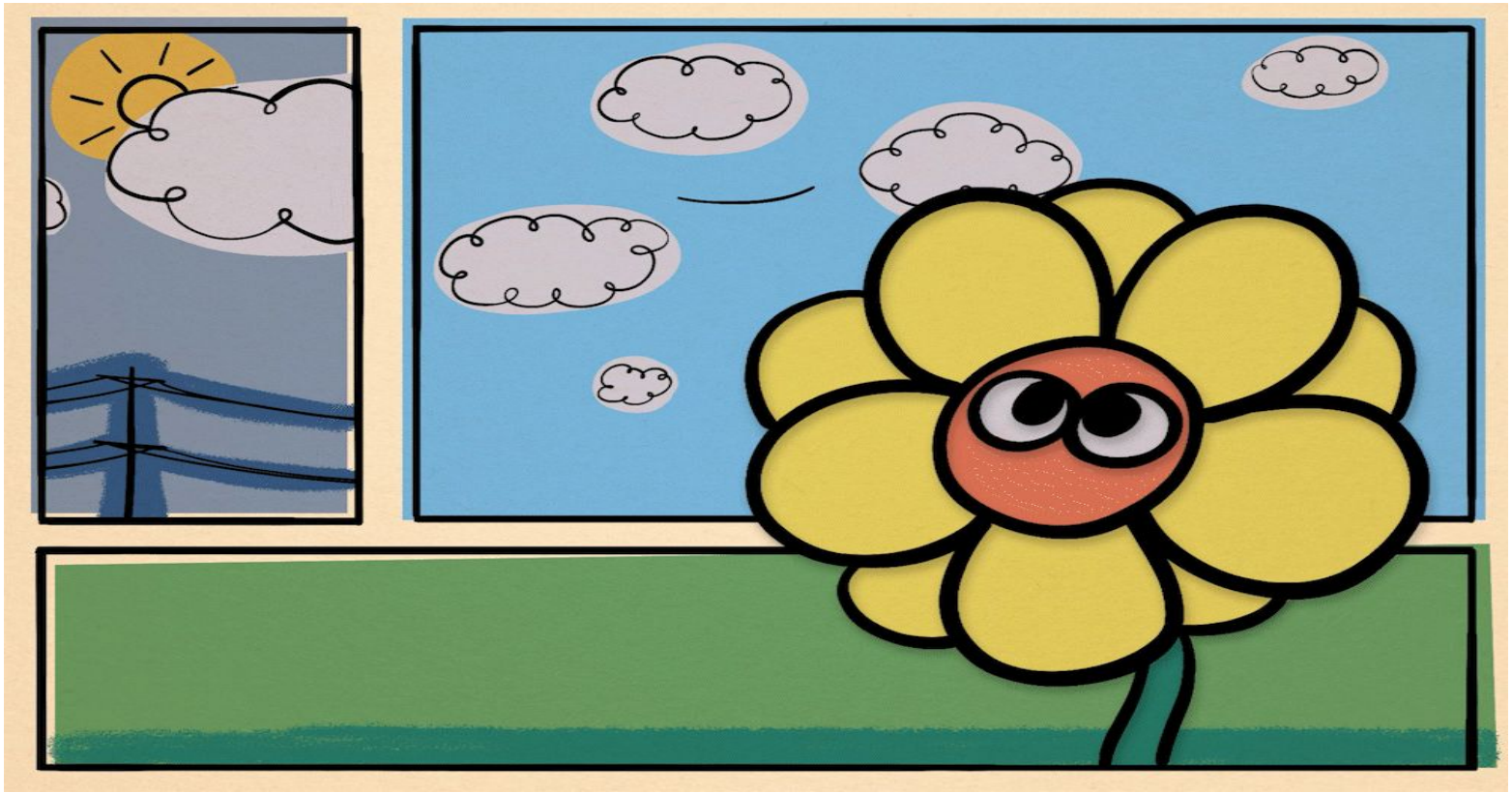
This allows us to make sequence of picture frames with changes in the picture by appropriately moving the individual cel.

6. Route sheets

The sheet which describes each scene and the people responsible for the various aspects of producing the sense is called route sheet

7. Exposure Sheet

The sheet which is an immensly detailed description of animation is called exposure sheet.



computer based animation

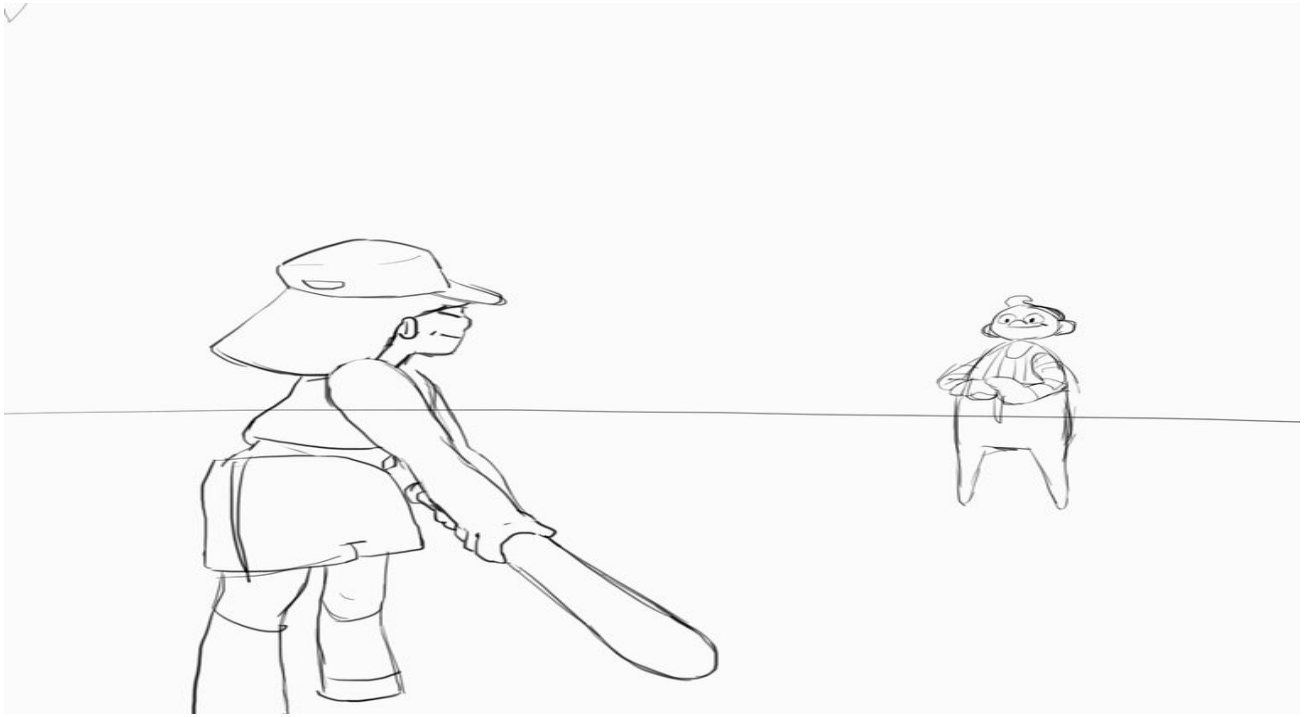
A computer based animation is on animation performed by a computer using graphical tools to provide visual effects. A computer based animation includes the given four basic steps:

1. Input process/ Digitization

- The image of object must be digitized or drawing should be completed before the animation process.
- These can be done by optical scanning or tracing the drawing with a data tablet or producing the drawings by the use of drawing application or programs.
- The digitize image should be kept in the key frames at extreme or characteristics position which has to be animated.

2. Composition stage:

- In this stage Foreground and background figures and colors are combined to generate the individual frames for the final animation.
- Several low resolution frames are place in a rectangular array to generate a trial film using pan zoom, features available in frame buffers.
- The frame buffer can take a particular portion of such an image (pan) and then enlarge it the entire screen (zoom).
- This process can be repeated on several frames of animation stored in the single image.
- If it is done fast enough, it gives the effect of continuity for animation.



3. In-between process:

- The animation of movement from one position to another position needs a composition of frames with intermediate position in-between the key frames. This is called in-between process it is created out by interpolation method,
- In this process systems gets only the starting and ending position.
- The easiest interpolation method is linear Interpolation called leaping, it has the limitations.
- For example if leaping is used to calculate intermediate position of a thrown ball in the air using the sequence of 3 key frames, starting mid and final position, then it will not helped.
- In such situation splines are used. Splines can be used to vary any parameter smoothly as a function of time. It can make an individual point move smoothly in space and time, in-between process also involves interpolation of objects shape in immediate frames.

4. Changing colors:

- For changing color, computer based animation, usages CLUT (color lookup table) in a frame buffer and the process of double buffering.
- The CLUT animation is generated by manipulating the color lookup table.
- The simplest method is to cycle the colors in the LUT. Thus changing the color of various pieces of the image, using LUT animation is faster than sending an entire new pixmap to the frame buffer or each frame.

Animation languages

1. linear list notations language:

Each event in the animation is described by start and ending frame number and an action that is to take place (event). For example:

42, 53, B, rotate, “palm”, 1, 30

Here,

42 => start frame no.

53 => ending frame no.

B => table.

Rotate => action.

Palm => object.

1 => start angle.

30 => end angle.

2. General purpose languages:

The high level computer languages which are developed for the normal application software development also have the animation supporting features along with graphics drawing, For example QBASIC, C, C++, java etc.

3. Graphical language:

it is also computer high level language and especially develop for graphics drawing and animation has been already develop for e.g. AutoCAD.

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.
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.

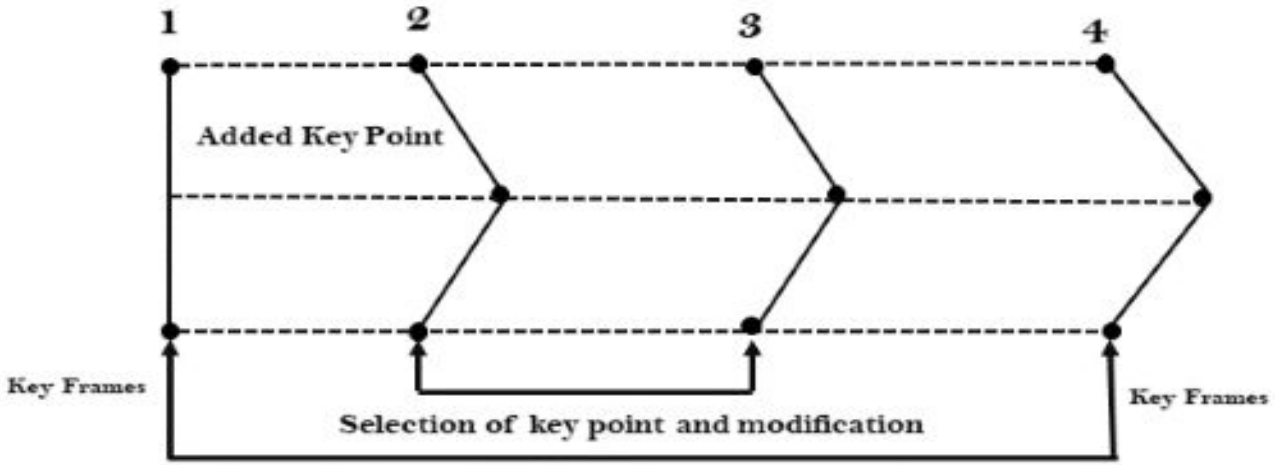


Fig: Process of Morphing

Motion Specification In Computer Animation

There are several ways in which the motions of objects can be specified in an animation system. We can define motion in very explicit tems, or We can use more abstract or more general approaches.

Direct motion specification / Geometric : -

- The most straightforward method for defining a motion sequence is direct specification of the motion paremeters.
- Here, We explicitly give the rotation angles and translation vectors.
- Then the geometric transformation matrices are applied to transform co-ordinate positions.

Goal-directed systems : -

- these systems are referred to as goal directed because they determine specific motion parameters given the goals of the animation.
- For example, We could specify that we want an object to "walk " or to "run" to a particular destination.
- The input directive are then interpreted in term of component motions that will accomplish the selected task.
- Human motion, for instance, can be defined as a hierarchical structure of sub motion for the toes, limbs, and so forth.

Kinematics and dynamics : -

- With a **kinematic** description, we specify the animation by giving motion parameters position, velocity, and acceleration, without reference to the forces that cause the motion.
- An alternate approach is to use inverse kinematics. Here, we specify the initial and final positions of objects at specified times and the motion parameters are computed by the system .
- For example, assuming zero acceleration , we can determine the constant velocity that will accomplish the movement of an object from the initial position to the final position.
- **Dynamic** descriptions on the other hand, require the specification of the forces that produce the velocities and acceleration.
- Descriptions of object behavior, generally referred to as a physically based modeling.
- Example of forces affecting object motion include electromagnetic, gravitational, friction, and other mechanical forces.