

## Multimedia →

Multimedia is an interactive media and provides multiple ways to represent information to the user in a powerful manner. It provides an interaction between user and digital information.  
It is a medium of communication.

## Multi-media

Multiple forms of media ex → Radio, TV, computer.

## Components of Multi-media →

- Text → Combination of symbol in any form.

- Graphics →

Makes the multimedia application attractive.

- Bitmap Images →

Real images that can be captured from devices like camera, scanner.

Generally not editable.

Require a large amount of storage.

- Vector Graphics →

Drawn on the computer and only requires small amount of memory.

Editable.

- Audio →

Analog, original sound signal.

Digital, computer stores the sound in digital form.

- Video →

Moving pictures accompanied by sound.

- **Animation** →

Is the process of making a static image look like it is moving.

Continuous series of still image that are displayed in a sequence.

**Text** → Text is the combination of symbols, letters, numbers and special characters.

- **Font** →

A design for a set of character.



- **Font size** →

The size of font, typically represented in points (pt).



Font Size	Example
8 point	Text
12 point	Text
24 point	Text
72 point	Text

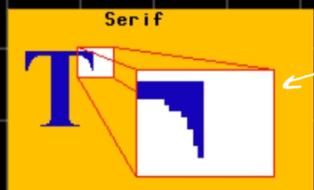
- **Font style** →

Refers to particular style of textual characters.

**Bold**  
Underline  
*italic*

Font categories →

- serif



Have a little "flag"

- sans serif



- decorative



Paragraph alignment →

left

center

right

justify

Hello .

Hello .

Hello .

Hello .

Hi :

Hi :

Hi :

Hi :

- english

Triple ,  
para

Arabic

To full the  
line .

## Working with text →

Things to be kept in mind while working with text.

### 1) Be concise →

- keep minimum
- long text ready on computer is difficult and time consuming.

### 2) Appropriate →

   
may attract younger formal format.

### 3) Make it readable →

use dash!

use dash!

Hello dash!

### 4) Consider type style and colours →

contrast & linking colour

contrast and background colour

- decorative

- Bold, Italic, Underline.

### 5) Use restraint and be consistent

- Use of various typefaces, sizes and styles. It is important to exercise restraint.

Raster / Bitmap image →

It's the most common form of storing images.

Bitmap →

Is a simple matrix of the tiny dots called pixel that forms a raster or bitmap image.

Comprehensive image means that an image looks as much as possible to original product.

i.e. The proportion, size, colour, and texture must be as accurate as possible.

- each pixel consists of 2 colours.

$$16:2 \rightarrow 2 \text{ colours}.$$

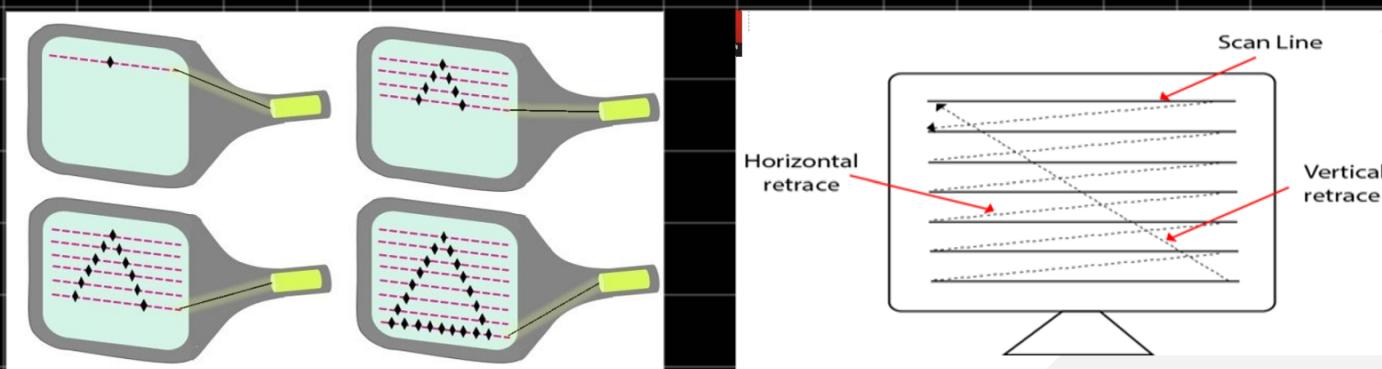
Bitmap font →

• It's a 2D font, which we convert to 3D world.

• These fonts has no thickness can't be rotated or scaled.

Raster Scan →

Displays an item as a group of separate points along each screen line.



```
void glutBitmapCharacter (void *font, int character)
```

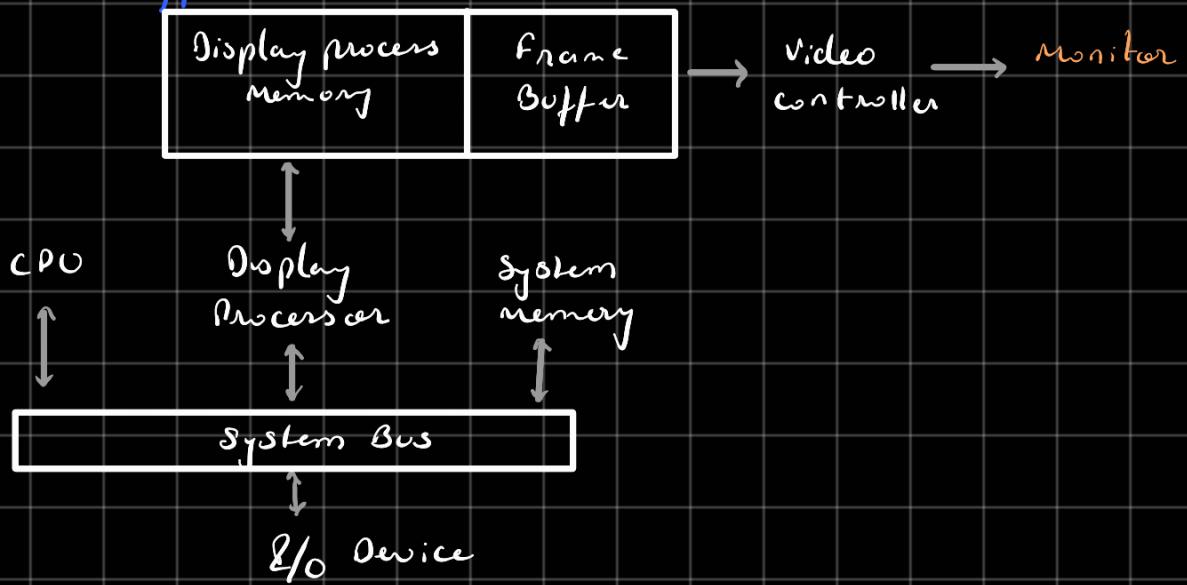
```
→ glutBitmapCharacter (Glut_BITMAP_NEVRAZCA_18, '3');
```

Frame Buffer →

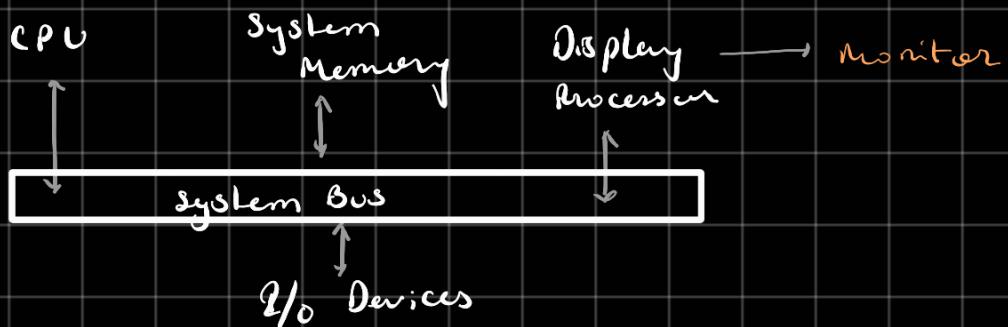
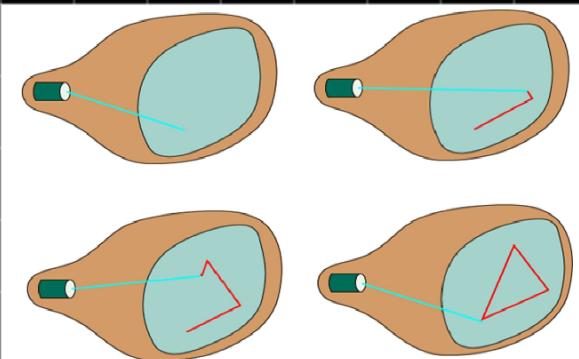
Picture description is stored in the memory area called as

Refresh Buffer or Frame Buffer

- 60 to 80 fps



Vector / Random Scan →



- 30 to 60 fps
- Less comprehensive

Random Scan	Raster Scan
1. It has high Resolution	1. Its resolution is low.
2. It is more expensive	2. It is less expensive
3. Any modification if needed is easy	3. Modification is tough
4. Solid pattern is tough to fill	4. Solid pattern is easy to fill
5. Refresh rate depends on resolution	5. Refresh rate does not depend on the picture.
6. Only screen with view on an area is displayed.	6. Whole screen is scanned.
7. Beam Penetration technology comes under it.	7. Shadow mark technology comes under this.
8. It does not use interlacing method.	8. It uses interlacing
9. It is restricted to line drawing applications	9. It is suitable for realistic display.

Character set →

- It is a list of characters recognized by system as hardware.
- Of two types →
  - ASCII (American Standard Code for Information Interchange.)
  - EBCDIC (Extended Binary Code Decimal Interchange Code.)

Hyperlink, Hyperlink, Hypermedia →

### HYPertext VERSUS HYPERLINK

Hypertext	Hyperlink
It's simply a text that directs users to a link.	It's a URL the hypertext directs you to.
It refers to the keywords that are usually represented with blue type and displays the info of the subject of interest when clicked or hover upon.	It is a reference in a hypertext document that directs you to some other part of the same document or to a different document altogether.
It contains only text or a bunch of text that are attached with hyperlinks.	It contains all types of media such as pictures, videos, graphics, animations, etc.
Hypertext is associated with keywords.	Hyperlink is associated with anchor texts.

### HYPertext VERSUS HYPERMEDIA

Hypertext	Hypermedia
It refers to text which links to other chunks of text within same or different document.	It is an extension of hypertext which is not constrained to be text-based.
It is an interconnected network of documents linked together via strong cross referencing tools called hyperlinks.	It refers to a non-linear presentation of content that includes plain text, images, audio, video, and still or moving graphics.
It simply allows users to jump from one document to another by clicking on "go to" links.	It extends the ability of hypertext to include links within all sorts of multimedia objects.
Hypertext technology is based on effective human-computer interaction and relevant cross referencing of related items.	Hypermedia technology extends the use of multimedia elements to create clickable links that readers can both access and interact with.
It represents multimedia content in electronic text format.	It combines both hypertext and multimedia to represent a wealth of information.

Colour →

Red, Green, Blue.

→ Cyan Magenta Yellow and Black.

Color Pallet →

CLUT - color look up table

size - 256, 256, 256

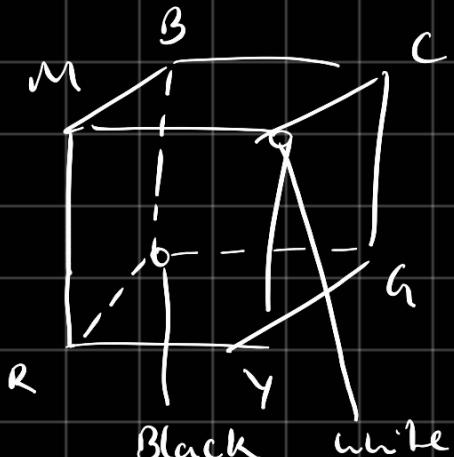
Dithering → add noise

color value of each pixel moves to the closer value in target palette  
for quantization distortion reduction

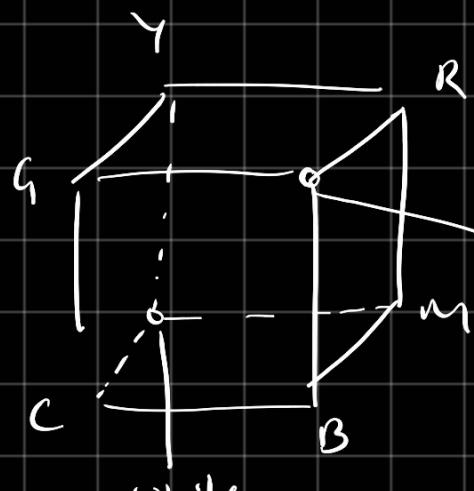
Adaptive Palette →

Hardware Pallette →

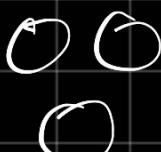
Colour Cube →



RGB cube



CMY cube



Transform from RGB to CMY →

$$\begin{bmatrix} C \\ M \\ Y \end{bmatrix} = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix} - \begin{bmatrix} R \\ G \\ B \end{bmatrix}$$

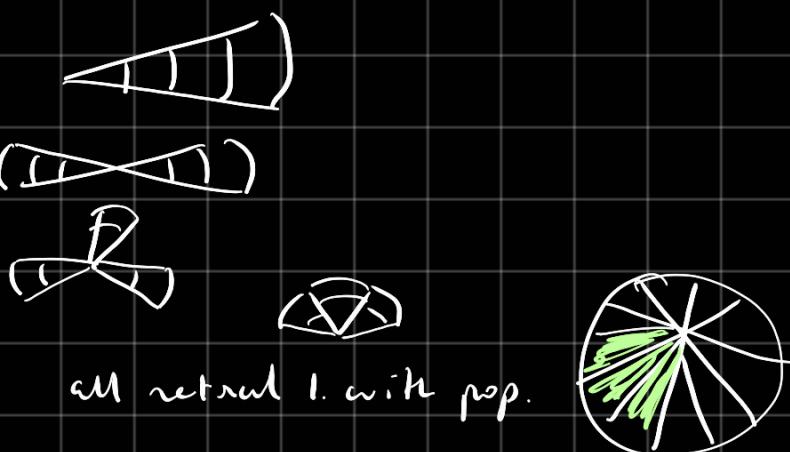


## 7-types of colour schemes →

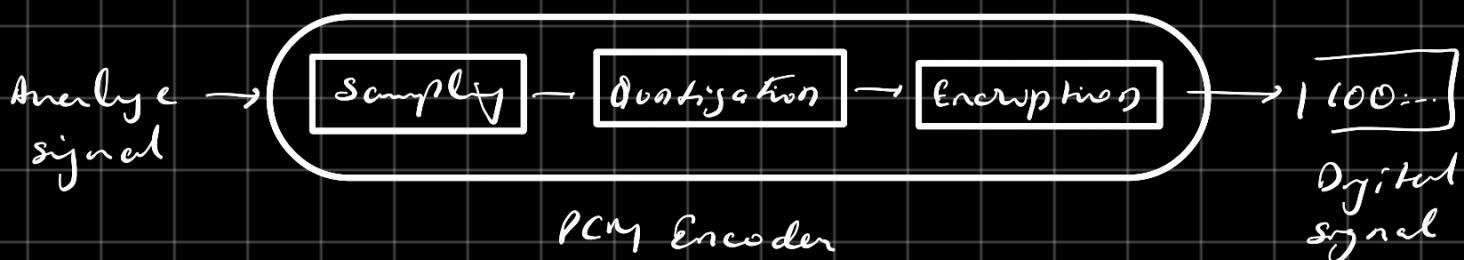
1. Monochrome
2. Analogous
3. Complementary
4. split complementary
5. square
6. rectangle
7. Triadic

## 5-types of color palettes

1. Monochrome
2. Complementary (△ ⊞ △)
3. Triad
4. Analogous
5. Neutral with a pop all neutral b. with pop.



## Digitalization of sound →



## Sampling →

Converts continuous signal (analogue) to discrete signal.

- Number of samples taken in per unit time.

min 11 KHz

max 4

frequency of oscillations per unit time.

$$\text{Frequency} = \frac{1}{T} \text{ Hz}$$

Bandwidth →

Maximum amount of data transmitted per unit time.

$$B = [f_{\text{max}} - f_{\text{min}}] \text{ bits/sec}$$

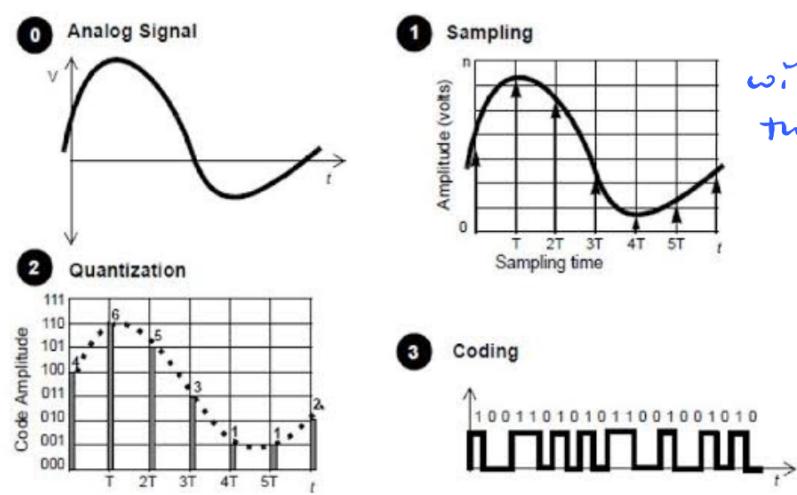


Figure 1.2 The three steps of digitalization of a signal: sampling of the signal, quantization of the amplitude, and binary encoding.

Decibel system →

- dB used to measure sound level.
- measure sound's intensity (amplitude)
- 85 dB causes hearing loss.

Data rate →

The rate at which data is transferred within the system.

$$S = A/T$$

A = amount of data  
T = transfer time.

Bandwidth →

Number of bits per second that a link can send or receive.

Band rate →

Number of signal unit per second.

## Audio file format →

1. WAV (Waveform Audio) . wav

1st audio file by IBM

2 AIFF (Audio Interchange File Format) . aif

Apple file format.

3. ALAC (Apple lossless Audio Codec) . m4a

4. FLAC (Free Lossless Audio Codec) . flac

Amazon for their HD streaming services.

5. MP3 → MPEG-1 (Moving Picture Expert Group -1) . mp3

6. AAC (Advanced Audio Coding) . acc

Song, dolby and other --.

7. WMA (Windows Media Audio) . wma

In response to mp3 by Microsoft.

## Sound Synthesis →

Generation of sound using algorithms in analogue or digital forms

### Types →

FM - modulated waveform ad waveform combine.

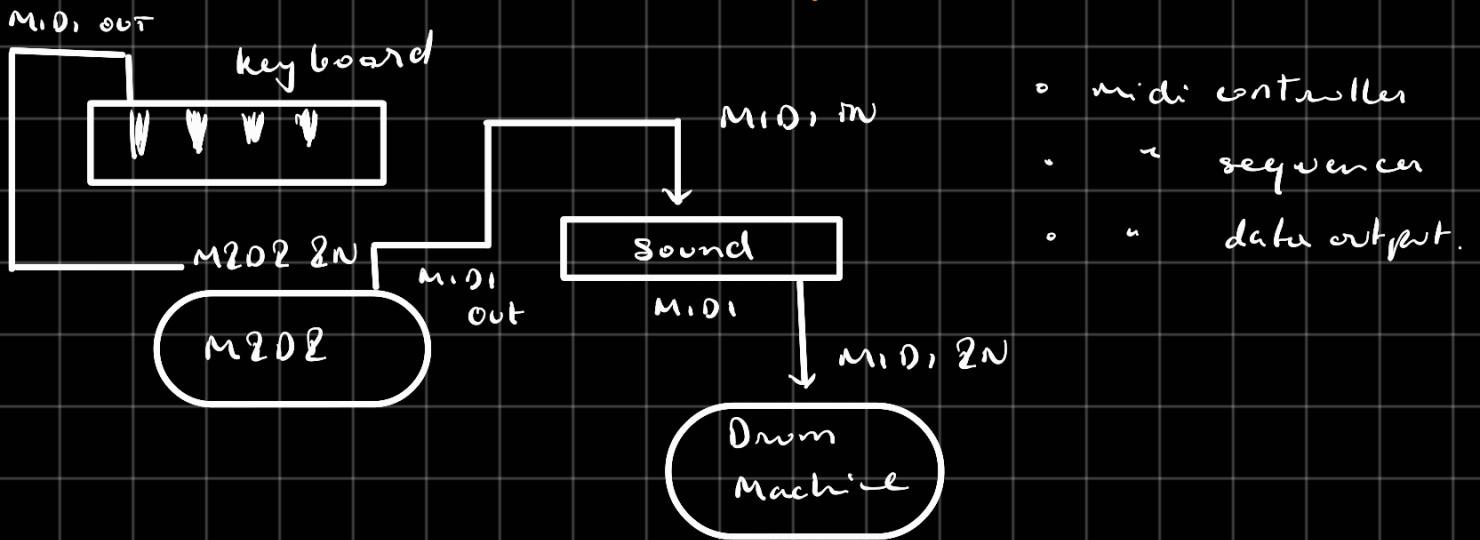
Subtractive - basic waveform

Additive - sin waveform

Wave table - multiple waves

} envelope  
filter  
effects.

## Musical Instrument Digitization Interface (MIDI)



### 13.6.3 Comparison between MIDI and Digitized Audio

Comparison	MIDI	Digitized Audio
Representation	Shorthand representation of music stored in numeric form	Sampling is done to convert the data into digital form
Device Independence	Device dependent	Device Independent
File Size	200 to 1000 times smaller than Digitized Audio	Larger File Size
Memory Requirement	Less storage space	Large Storage space
Edit Options	Easily editable and all the information retainable	Difficult to edit.
Quality	Better when played on high quality MIDI device	Not so better
Playback	Does not have consistent playback quality	Consistent playback quality

compression and transmission of audio on Internet →

What is compression?

- Reduction in the number of bits needed to represent data.
- Save storage space.

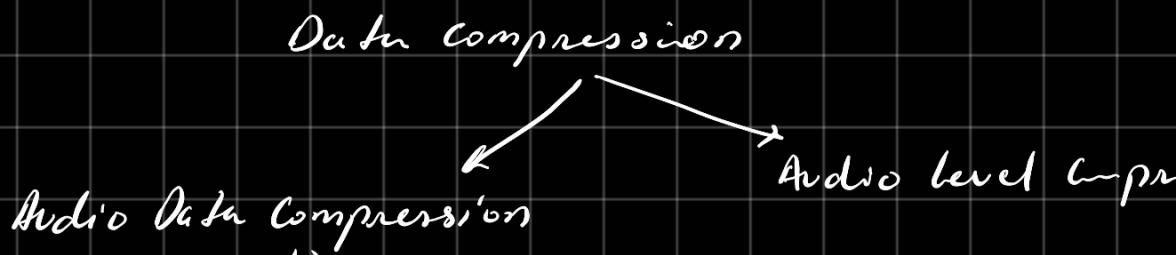
## Audio compression —

audio compressors are a form of data compressors designed to reduce the size of audio data files.

Can mean two things —

- Audio data compression
- Audio level compression

- A Data compression the data stored in waveform is reduced for transmission.



- removes no longer needed data
- signal is same as original — perfect reconstruction
- removes irrelevant data
- quality is reduced.

## Advantages of Audio compression.

- Faster transmission time.
- less costly
- smaller size
- Number of bit reduction — Bandwidth.

## Disadvantages —

- Transmitter and receiver both should support same compression methods.
- Need processing for encoding and decoding.
- with lossy quality is reduced

RGB -

RGBA - with opacity, alpha field

Grayscale - 0, 255

## Basic Image Processing —

The process of transforming a image into a digital form and performing certain tasks to get useful information.

There are 5 main types of image processing.

Visualization — study objects that are not visible in the image.

Recognition — distinguish objects in the image.

Sharpening and restoration — enhancing the image

Pattern recognition — measure various patterns

Retrieval — Browse and search images from a large database that are similar to the original images.

## Use of image editing software

- Image enhancement
- Increase and decrease contrast
- " brightness
- Removing reflections
- Resizing images
- Cropping images
- Photo restoration
- Faded colors

- Tears

## Gamma Correction →

1.

2.

3.

4.

## Photo editing and Retouching →

### Editing

- Correction of -  
primary colors,  
temperature  
cropping  
adding signs

### Retouching

- Elements of retouching -  
blemish removal,  
improving facial features,  
makeup,  
addition and removal of  
object
- It is a adept process of image editing.
- e.g. teeth whitening,  
background removal,  
nugly blemishes.
- This process is time consuming.
- complex
- for giving a professional look.

## High-end retouching →

- remove unwanted spots, wrinkles, etc. on face
- Use your photo for poster, billboards.

## Video →

- Video is an electronic medium for reading, copying, play back and display of moving visual media.

## Characteristic of Video →

- Number of frames per second
- Aspect ratio
- Pixel per inch
- Video Quality

## Video Types →

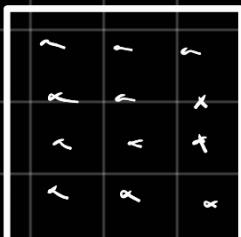
### 1) Analog Video →

- Analog video is a video signal transferred by analog signal.
- Colour Video Signal
  - Analog colour video signal contains luminance, brightness, and chrominance of an analog television image.

When combined into one channel it is called Composite video.

### - Progressive Scanning →

$\frac{6080p}{=}$



In two channels -

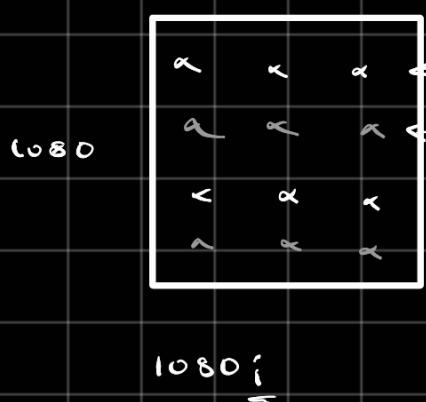
Video (YC) and  
Multi-channel

→ whole screen  
gets refreshed.

- Too much data transfer required.
- So many TV channels broadcasts 720p

a bit lower resolution image.

## - Interlace Scanning →



Divides pixels into odd and even.

- Now the data transferred required get cut by 50%.
- At a time either odd or even pixels will glow.

## 2) Digital Video →

- It is representation of many visual images in the form of encoded digital data.  
made using camera, camcorder.
- can be easily edited.
- can be edited, remove noise, cut, paste

## Storage →

- DVD (Digital Versatile Disk)
- Blue-ray Disc

## Animation →

### Types →

- Hand-Drawn
- Stop motion
- Motion graphics
- Computer Animation

- 2D
- 3D

Morphing →

Is the process in which the source image is gradually distorted and vanished.

- Methods of Morphing

- mesh based method
- feature based method

Morphing is an animation function which is used to transform object shape from one form to another.

Steps -

1. Select 1st and final image
2. Create key frame for smooth transitioning.
3. Key point of the first image transforms to key point of second img.

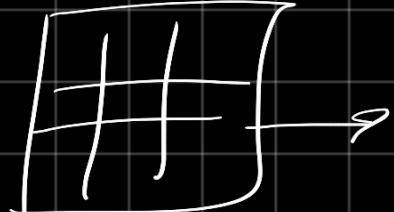
Shooting and Editing Video →

Shooting a video is a continuous process. It's all about the technique and the instinct.

Tips for shooting professional looking video →

- Plan your shot
- Camera movement
- Camera angle
- Pan tilt zoom
- Lighting
- The Lapse

- Rule of Thirds



- B-Roll footage (Behind the scenes)
- Shoot Multiple Takes

## Professional video editing tips →

- Match Cut

Cuts to another shot that looks similar but is usually from a different scene.

- Jump Cut

Cuts to the same subject in the same scene, during same take frame.

- J and L      J → Audio then video

L → Video then audio

- Cutting on Action

- Montage      ↗

- Color correction and color grading.      →

- Music and SFX      ↗

## Image compression →

- JPEG (Joint Photographic Experts Group)

- lossy

- GIF (Graphic Interchange Format)

- PNG (Portable Network Graphics)

- JPEG

## ◦ TIFF (Tagged Image File Format)

Animation Morphing →

- Morphing at max
- Direct Morphing
- 3D morphing

spatial - size

temporal - pixel qual  
by

Video Campr. →

Technique

- MPRG1	4. 261
- u 2	. 263
u 4	. 263t
u 7	. 264
u 21	

1- object - . . .

2- meta data

21 - All

261 - frame wise OR

263 - memory

263t - bidirectional

264 - All

line lat rate

NTSC      PAL      SECAM      HD TV

- |       |          |       |             |
|-------|----------|-------|-------------|
| • Am  | • Europe |       |             |
| • 525 | • 625    | • 625 | • 725       |
| • 60f | • 25f    | • 50f | • 60f    2K |

Media Authoring →

metaphor.

- enabling
- environment for joining together different elements of media

Feature of Authoring Tools →

- Editing
- Organising
- Visual programming

- Program with script
- play back feature
- Internet programmability

Tools →

Card based

Icon based

Tree based

Object-Oriented

- State
- Behavior

Macromedia Director →

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