Unit-4. CGM:

Multimedia refers to the integration of multiple forms of media, including text, images, audio, video, animations and interactive content, to convey information effectively.

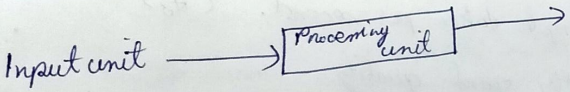
Components of Mm:

① Text: ② Images ③ Audio ④ Video

Multimedia System:

It is a system which can be used to run processing the multimedia data and application.

Components of Ms:



Sound:

Sound is a vibration that propagates through a medium in the form of a mechanical wave

Properties:

① Frequency: No. of vibrations per second, measured in Hertz (Hz).

- Low frequency - low pitch (bass)
- High frequency - High pitch (whistle)
- Human Hearing Range - 20 Hz to 20000 Hz.

  Infrasound - Below 20 Hz.

  Ultrasound - Above 20 KHz.

② Amplitude (Loudness):

- Is the height of sound wave
- Measured in decibels (dB)
  - Higher amplitude – Louder sound

③ Wavelength: Distance between two consecutive peaks of sound wave.

- Higher frequency – Shorter wavelength.
- $\lambda = \frac{v}{f}$ → speed of sound
  → frequency.

* Digitizing Sound (Analog to digital):

① Sampling: Capturing sound at discrete time intervals.

- Sampling Rate: No. of samples taken per second. (Hz)
- Higher sampling rate = Better sound quality.
- Common sampling rates:
  - 8 kHz – Telephone.
  - 44.1 kHz – CD
  - 96 kHz – Professional audio.
- Nyquist Thm: To accurately represent a sound, the sampling rate must be at least twice the highest frequency in the sound.

② Quantization: Assigning numerical values (discrete levels) to sampled pts.

- Bit depth (Sampling size): No of bits used to store each sample.

③ Encoding (Binary Representation): The quantized values are converted into binary code for storage and processing.

* Audio file formats :

① WAV ② PCM ③ MP3 ④ AAC ⑤ FLAC.

MIDI (Musical Instrument Digital Interface)

⇒ MIDI is a communication protocol that allows electrical musical instruments, computer and other devices to communicate with each other.

In other words MIDI is a system application consisting of both hardware and software components which define interconnectivity and communication protocol for electrical synthesizer, keyboards and other musical instrument.

Components :

① MIDI Hardware ⑪ MIDI message ⑩ MIDI file format.

① MIDI Hardware : Includes devices that send, receive and process MIDI messages.

ⓐ Port : It consist
- ⓐ MIDI IN = Connecting musical instrument to the input of computer.
- ⓑ MIDI OUT = Connecting musical instrument to the output of computer.
- ⓒ MIDI Through = Connecting musical instrument with each other.

ⓑ Sound Generator = Producing sound in musical instrument.

ⓒ Microprocessor = Scheduling, Synchronization and recording of data.

ⓓ Keyboard = Sending MIDI instruction.

ⓔ Control Panel = It contains a button that turns the synthesizer on or off.

ⓕ Memory = Needed to store the MIDI Instruction.

(11) MIDI message :

A group of bytes that can be interpreted as meaningful midi performance command. Each MIDI message communicate one musical events bet" machine. MIDI message can be classified into two main classes —

(i) Channel message (ii) System message.

(i) Channel message :

Are used to segregate message. There are 16 channels (0-15)

eg. Channel 1 is for piano & 8 is for drum.

(i) Voice message (ii) Mode message.

(i) Voice message — Specifies about musical notes, key pressure, channel pressure control change & pressure change.

(ii) Mode message — ~~Channel message determ~~ Specify whether to respond to the voice message as per channel.

(2) System message - Meant for command that are not channel specific

(i) System comman message - Intended for all receiver in the system

(ii) SRTM - Messages are used to synchronize all MIDI equipment.

(iii) SExM - Allow midi manufacturer to customize MIDI message to send to their MIDI devices.

* MIDI file format -

⇒ .MID.