Semester-6

BCA 603

Multimedia Systems

Unit – 1

Evolution of Multimedia and its objects –

- Multimedia is a representation of information in an attractive and interactive manner with the use of a combination of text, audio, video, graphics and animation.
- In other words we can say that Multimedia is a computerized method of presenting information combining textual data, audio, visuals (video), graphics and animations. For examples: E-Mail, Yahoo Messenger, Video Conferencing, and Multimedia Message Service (MMS).

Formative Evaluation

- There are three major stages or steps that occur in the formative evaluation of multimedia hardware or software: the development of a prototype, the pilot text and the field text. A prototype can be a model, a mock-up or even a paper template representing a sample screen, lesson, or module of a software program. Prototypes can be conceptual, allowing for early feedback, or working, allowing for hands-on.

Summative Evaluation

- In summative evaluation, the worth of a program or the overall effectiveness of the finished multimedia product is judged. In contrast to formative evaluation, summative evaluation is conducted is delivered.

Scope of Multimedia in Business & Work –

- Multimedia, such as mobile marketing, live-casting and podcasting, photo, video and file sharing, can spread the word about your company and help build brand awareness in a very unique and powerful way. This particular type of social media also has the ability to go viral quickly.

Multimedia for Business Marketing:

Several online communities exist for the purpose of uploading and sharing photos over the Web, and many small businesses have learned to take

advantage of these services to market their products. Here is the most common photo sharing marketing strategies.

1. Offer real-time incentives. Twitter's Tweet Photo will automatically enable you to publish photos to your Twitter and Facebook accounts for free via mobile and Web platforms. Who needs 140 characters to describe your business when a picture is worth 1,000 words? Tweet pictures of discounted and new items or offer exclusive incentives.

2. Join like-minded communities. At no cost, Yahoo!operated Flickr provides a useful platform for photo management and sharing. "The first thing that I tell people is that Flickr is not just a photo storage place," says Matt McGee, independent online marketing consultant of the Tri-Cities, Washingtonbased, Small Business Search Marketing.

Production & Planning of Multimedia applications –

- Multimedia projects are complex; they often involve the skills and efforts of multiple teams or people. During the development process, a project moves through the specialized parts of the team, from story creation to technical editing, with regular collective review sessions Each stage is designed to refine the project with attention to the client's needs, technical requirements and audience preferences.

Planning Meeting to Start the Process:

- A planning meeting is a crucial part of the multimedia development process; it creates a shared vision for everyone working on the project. The meeting usually kicks off a project, bringing together the team. During the meeting, the project manager communicates the major goals and lays out the milestones. The meeting may include a discussion of the target audience and how each division can help support the overarching goal.

Creative Brief and Script Writing:

- Most multimedia projects have a story behind them. After the initial meeting, the people in charge of the background story write a script, creative brief or outline. The text hits the main points of the project and uses language that appeals to the audience in jargon, tone and style.

Story Boarding to Tie the Elements Together:

- A multimedia project usually includes multiple pieces: audio, video, imagery, text for voiceovers and on-screen titles. Story boarding ties everything together; a story board panel for a scene includes a sketch of the visual elements, the voiceover or title text, and any production notes. It guides the process, keeps everyone in check and gives structure to the project.

Designing the Visual Aspects:

- During the design stage, designers take over the visual aspects of the project to determine how it looks and feels. Using the notes from the storyboard, they create graphics, design the navigation and give direction to photographers and videographers regarding the correct shots. Depending on the project, the design stage might include graphic design, web design, information design, and photography or image collection. Design is always done with an eye toward the audience

Multimedia Hardware –

Most of the computers now-a-days come equipped with the hardware components required to develop/view multimedia applications. Following are the various categories in which we can define the various types of hardwares required for multimedia applications.

- **Processor** The heart of any multimedia computer is its processor. Today Core 15 or higher processor is recommended for a multimediacomputer.
    - CPU is considered as the brain of the computer.
    - CPU performs all types of data processing operations.
    - It stores data, intermediate result and instructions (program)

- **Memory and Storage Devices** - You need memory for storing various files used during production, original audio and video clips, edited pieces and final mined pieces. You also need memory for backup of your project files.
    - **Primary Memory**- Primary memory holds only those data and instructions on which computer is currently working. It has limited capacity and data gets lost when power is switched off. It is generally made up of semiconductor device. These memories are not as fast as registers. The data and instructions required to be processed earlier reside in main memory. It is divided into two subcategories RAM and ROM.
    - **Flash Memory**- Cache memory is a very high speed semiconductor memory, which can speed up CPU. It acts as a buffer between the CPU and main memory. It is used to hold those parts of data and program which are most frequently used by CPU. The parts of data and programs are transferred from disk to cache memory by operating system, from where CPU can access them.
    - **Secondary Memory:** This type of memory is also known as external memory or non-volatile. It is slower than main memory. These are used for storing Data/Information permanently. CPU directly does not access these memories; instead they are accessed via input-output routines. Contents of secondary memories are first transferred to main memory and then CPU can access it. For example, disk, CD-ROM, DVD, etc.
- **Input Devices** - Following are the various types of input devices which are used in multimedia systems.
    - **Keyboard**- Most common and very popular input device is keyboard. The keyboard helps in inputting the data to the computer. The layout of the keyboard is like that of traditional typewriter, although there are some additional keys provided for performing some additional functions. Keyboards are of two sizes 84 keys or 101/102 keys, but now 104 keys or 108 keys keyboard is also available for Windows and Internet. The keys arefollowing:

Sr. No.	Keys	Description
1	Typing Keys	These keys include the letter keys (A-Z) and digits keys (0-9) which generally give same layout as that of typewriters.
2	Numeric Keypad	It is used to enter numeric data or cursor movement. Generally, it consists of a set of 17 keys that are laid out in the same configuration used by most adding machine and calculators.
3	Function Keys	The twelve functions keys are present on the keyboard. These are arranged in a row along the top of the keyboard. Each function key has unique meaning and is used for some specific purpose.
4	Control keys	These keys provide cursor and screen control. It includes four directional arrow key. Control keys also include Home, End, Insert, Delete, Page Up, Page Down, Control(Ctrl), Alternate(Alt), Escape(Esc).
5	Special Purpose Keys	Keyboard also contains some special purpose keys such as Enter, Shift, Caps Lock, Num Lock, Space bar, Tab, and Print Screen.

- **Mouse** - Mouse is most popular Pointing device. It is a very famous cursor-control device. It is a small palm size box with a round ball at its base which senses the movement of mouse and sends corresponding signals to CPU on pressing the buttons. Generally, it has two buttons called left and right button and scroll bar is present at the mid. Mouse can be used to control the position of cursor on screen, but it cannot be used to enter text into the computer.

- **Joystick** - Joystick is also a pointing device, which is used to move cursor position on a monitor screen. It is a stick having a spherical ball at its both lower and upper ends. The lower spherical ball moves in a socket. The joystick can be moved in all four directions. The function of joystick is similar to that of a mouse. It is mainly used in Computer Aided Designing (CAD) and playing computer games.

- **Light Pen** - Light pen is a pointing device, which is similar to a pen. It is used to select a displayed menu item or draw pictures on the monitor screen. It consists of a photocell and an optical system placed in a small tube. When light pen's tip is moved over the monitor screen and pen button is pressed, its photocell sensing element detects the screen location and sends the corresponding signal to the CPU.

- **Track Ball** - Track ball is an input device that is mostly used in notebook or laptop computer, instead of a mouse. This is a ball, which is half inserted and by moving fingers on ball, pointer can be moved.Since the whole device is not moved, a track ball requires less space than a mouse. A track ball comes in various shapes like a ball, a button and a square.

- **Scanner** - Scanner is an input device, which works more like a photocopy machine. It is used when some information isavailable on a paper and it is to be transferred to the hard disc of the computer for further manipulation. Scanner captures images from the source which are then converted into the digital form that can be stored on the disc. These images can be edited beforethey are printed.

- **Digitizer** - Digitizer is an input device, which converts analog information into a digital form. Digitizer can convert a signal from the television camera into a series of numbers that could bestored in a computer. They can be used by the computer tocreate a picture of whatever the camera had been pointed at. Digitizer is also known as Tablet or Graphics Tablet because it converts graphics and pictorial data into binary inputs. A graphic tablet as digitizer is used for doing fine works of drawing and images manipulation applications.

- **Magnetic Ink Card Reader (MICR)** - MICR input device is generally used in banks because of a large number of cheques to be processed everyday. The bank's code number and chequenumber are printed on the cheques with a special type of ink thatcontains particles of magnetic material that are machine readable. This reading process is called Magnetic Ink Character

Recognition (MICR). The main advantage of MICR is that it is fast and less error prone.

- **Optical Character Reader (OCR)** - OCR is an input device used to read a printed text. OCR scans text optically character by character, converts them into a machine readable code and stores the text on the system memory.

- **Bar Code Readers** - Bar Code Reader is a device used for reading bar coded data (data in form of light and dark lines). Bar coded data is generally used in labelling goods, numbering the books, etc. It may be a hand-held scanner or may be embedded in a stationary scanner.Bar Code Reader scans a bar code image, converts it into an alphanumeric value, which is then fed to the computer to which bar code reader is connected.

- **Optical Mark Reader (OMR)** - OMR is a special type of optical scanner used to recognize the type of mark made by pen orpencil. It is used where one out of a few alternatives is to be selected and marked. It is specially used for checking the answer sheets of examinations having multiple choice questions.

- **Voice Systems** - Following are the various types of input devices which are used in multimedia systems.
  - **Microphone**- Microphone is an input device to input sound that is then stored in digital form. The microphone is used for various applications like adding sound to a multimedia presentation or for mixing music.

  - **Speaker**- Speaker is an output device to produce sound which is stored in digital form. The speaker is used for various applications like adding sound to a multimedia presentation or for movies displays etc.

- **Digital Camera** - Digital camera is an input device to input images that is then stored in digital form. The digital camera is used for various applications like adding images to a multimedia presentation or for personal purposes.

- **Digital Video Camera** - Digital Video camera is an input device to input images/video that is then stored in digital form. The digital video camera is used for various applications like adding videosto a multimedia presentation or for personal purposes.

- **Output Devices** - Following are few of the important output devices, which are used in Computer Systems:
  - **Monitors** - Monitor commonly called as Visual Display Unit (VDU) is the main output device of a computer. It forms images from tiny dots, called pixels, that are arranged in a rectangular form. The sharpness of the image depends upon the number of the pixels. There are two kinds of viewing screen used for monitors:
    - **Cathode-Ray Tube (CRT) Monitor**- In the CRT, display is made up of small picture elements called pixels for short. The smaller the pixels, the better the image clarity or resolution. It takes more than one illuminated pixel to form whole character, such as the letter 'e' in the word help. A finite number of characters can be displayed on a screen at once. The screen can be divided into a series of character boxes - fixed location on the screen where a standard character can be placed. Most screens are capable of displaying 80 characters of data horizontally and 25 lines vertically.

    - **Flat-Panel Display Monitor**- The flat-panel display refers to a class of video devices that have reduced volume, weight and power requirement compared to the CRT. You canhang them on walls or wear them on your wrists. Current

uses for flat-panel displays include calculators, videogames, monitors, laptop computer, graphics display. The flat-panel displays are divided into two categories:

- **Emissive Displays**- The emissive displays are devices that convert electrical energy into light. Examplesare plasma panel and LED (Light-Emitting Diodes).
- **Non-Emissive Displays**- The Non-emissive displays use optical effects to convert sunlight or light from some other source into graphics patterns. Example is LCD (Liquid-Crystal Device)

- **Printers** - Printer is the most important output device, which is used to print information on paper.
  - **Dot Matrix Printer**- In the market, one of the most popular printers is Dot Matrix Printer because of their ease of printing features and economical price. Each character printed is in form of pattern of Dot's and head consists of a Matrix of Pins of size (5*7, 7*9, 9*7 or 9*9) which comes out to form a character thatis why it is called Dot Matrix Printer.

  - **Daisy Wheel**- Head is lying on a wheel and Pins corresponding to characters are like petals of Daisy (flower name) that is why it is called Daisy Wheel Printer. These printers are generally used for word-processing in offices which require a few letters to be send here and there with very nice quality representation.

- **Line Printers**- Line printers are printers, which print one line at a time.

- **Laser Printers**- These are non-impact page printers. They use laser lights to produce the dots needed to form the characters to be printed on a page.

- **Inkjet Printers**- Inkjet printers are non-impact character printers based on a relatively new technology. They print characters by spraying small drops of ink onto paper. Inkjet printers produce high quality output with presentable features. They make less noise because no hammering is done and these have many styles of printing modes available. Colour printing is also possible. Some models of Inkjet printers can produce multiple copies of printing also.

- **Screen Image Projector** - Screen image projector or simply projector is an output device used to project information from a computer on a

large screen so that a group of people can see it simultaneously. A presenter first makes a PowerPoint presentation on the computer. Now a screen image projector is plugged to a computer system and presenter can make a presentation to a group of people by projecting the information on a large screen. Projector makes the presentation more understandable.

- **Speakers and Sound Card** - Computers need both a sound card and speakers to hear audio, such as music, speech and sound effects. Most motherboards provide an on-board sound card. This built-in-sound card is fine for the most purposes. The basic functions of a sound card are that it converts digital sound signals to analog for speakers making it louder or softer.

Memory and Storage devices –

- The storage devices are one of the most important components of the computer system. They are the data storage devices that are used to store the data. The computer has many types of data storage devices. Some of them can be classified as the removable data Storage Devices and the others as the non removable data Storage Devices.
- The memory is of two types; one is the primary memory and the other one is the secondary memory. The primary memory is the volatile memory and the secondary memory is the non volatile memory.
- The volatile memory is the kind of the memory that is erasable and the non volatile memory is the one where in the contents cannot be erased.

The secondary memory is used to store the data permanently in the computer.

- The secondary storage devices are usually as follows: hard disk drives – this is the most common type of storage device. The other ones include the floppy disk drives, the CD ROM, and the DVD ROM. The flash memory, the USB data card etc.

Communication Devices –

- A **communication device** is a hardware device capable of transmitting an analog or digital signal over the telephone, other communication wire, or wirelessly.
- A classic example of a communication device is a computer modem, which converts a computer's digital information to an analog signal for transmission over a telephone line. Similarly, a modem receives analog signals, and converts them to digital, for processing by the computer.
- This process is called modulation/demodulation, from which the modem gets its name.

Other examples of communication devices include a NIC (network interface card), Wi-Fi devices, and access points.

Multimedia Software –

Following are the various categories of Multimedia software

- **Device Driver Software**- These softwares are used to install and configure the multimedia peripherals.
- **Media Players**- Media players are applications that can play one ormore kind of multimedia file format.
- **Media Conversion Tools**- These tools are used for encoding / decoding multimedia contexts and for converting one file format to another.
- **Multimedia Editing Tools**- These tools are used for creating and editing digital multimedia data.
- **Multimedia Authoring Tools**- These tools are used for combingdifferent kinds of media formats and deliver them as multimedia contents.

Unit – 2

Production & Planning of Multimedia building blocks –

he ability to access information stored as different media depends on the availability of standard data formats that is understand by most applications in use. Proprietary formats are typically more compact compared with open standard formats.

Although three are many proprietary formats for each media type, they are often not suitable for use in defining multimedia building blocks since the ability to access the information contained in those data files depend very much on the availability of filters for the respective applications.

1. **Text Data Formats:**

Text remains as the most basic data format in use today. Text formats can be divided into two areas:

- **Charset Encoding:**

Refers to formatting of individual characters. Characters have the following features:

- Encoding Method: ASCII (7/8 bit), UNICODE (16 bit).
- Attributes: Font, Size, Width, Color, and Style.

- **Document Encoding**

Text documents are made up of sequences of characters used to represent information. Document encoding formats vary in sophistication:

- Plain text: End-of-line using CR (Mac), LF (UNIX), CR/LF (DOS/Win). Formatting assumes fixed character widths and is given as is in the document.
- TeX, Rich Text Format (RTF), SGML and Derivatives (HTML, XML, etc.).

- **Text Data Size**

Plain text encoding for a data stream with X characters ASCII encoding: X characters, each 1 byte= X bytes. UNICODE encoding: X characters, each 2 bytes =2X bytes.

2. Graphics Data Format:

Graphics data can be divided into two types:

- **Raster Graphics**

Raster Graphics format captures attributes of an image such as:

- Resolution & pixel density (dpi)
- Quantization
- Color space (RGB, YUV, grayscale, palletized, etc.).

- **Vector Graphics**

Vector Graphics are resolution independent can be scaled to any size as they are mathematical description of images. Typically used for line-art and other synthetic image.

Text Sound (MIDI)-

- Musical Instrument Digital Interface (MIDI) is a technical protocol that governs the interaction of digital instruments with computers and with each other. Instead of a direct musical sound representation, MIDI provides the information on how a musical sound is made with the help of MIDI commands.
- The protocol not only provides compactness but also provides ease in manipulation and modification of notes, along with a flexible choice of instruments.

Digital Audio-

- Digital audio is a technology that is used to record, store, manipulate, generate and reproduce sound using audio signals that have been encoded in digital form.

- It also refers to the sequence of discreet samples that are taken from an analog audio waveform. Instead of a continuous sinusoidal wave, digital audio is composed of discreet points which represent the amplitude of the waveform approximately.
- The more samples taken, the better the representation, and hence impacts the quality of the digital audio. Most modern multimedia devices can only process digital audio, and in the case of cell phones requiring analog audio input, they still convert it to digital before transmission.

Audio file formats-

Audio format defines the quality and loss of audio data. Based on application different type of audio format are used. Audio formats are broadly divided into three parts:

1. Uncompressed Format
2. Lossy Compressed format
3. Lossless Compressed Format

1. Uncompressed Audio Format:

- **PCM –**
  It stands for Pulse-Code Modulation. It represents raw analog audio signals in digital form. To convert analog signal into digital signal it has to be recorded at a particular interval. Hence it has sampling rate and bit rate (bits used to represent each sample).
- **WAV –**
  It stands for Waveform Audio File Format, it was developed by Microsoft and IBM in 1991. It is just a Windows container for audio formats. That means that a WAV file can contain compressed audio. Most WAV files contain uncompressed audio in PCM format. It is just a wrapper. It is compatible with both Windows and Mac.
- **AIFF –**
  It stands for Audio Interchange File Format. It was developed by Apple for Mac systems in 1988. Like WAV files, AIFF files can contain multiple kinds of audio. It contain uncompressed audio in PCM format. It is just a wrapper for the PCM encoding. It is compatible with both Windows and Mac.

2. Lossy Compressed Fomat:

It is a form of compression that loses data during the compression process. But

difference in quality no noticeable to hear.

- **MP3 –**
  It stands for MPEG-1 Audio Layer 3. It was released in 1993 and became popular. It is most popular audio format for music files. Main aim of MP3 is to remove all those sounds which not hearable or less noticeable by humans ears. Hence making size of music file small. MP3 is like universal format which is compatible almost every device.
- **AAC –**
  It stands for Advanced Audio Coding. It was developed in 1997 after MP3.The compression algorithm used by AAC is much more complex and advanced than MP3, so when compared a particular audio file in MP3 and AAC formats at the same bitrate, the AAC one will generally have better sound quality. It is the standard audio compression method used by YouTube, Android, iOS, iTunes, and PlayStations.
- **WMA –**
  It stands for Windows Media Audio. It was released in 1999.It was designed to remove some of the flaws of MP3 compression method. In terms of quality it is better than MP3. But is not widely used.

3. Lossless compression:
This method reduces file size without any loss in quality. But is not as good as lossy compression as the size of file compressed to lossy compression is 2 and 3 times more.

- **FLAC –**
  It stands for Free Lossless Audio Codec. It can compress a source file by up to 50% without losing data. It is most popular in its category and is open-source.
- **ALAC –**
  It stands for Apple Lossless Audio Codec. It was launched in 2004 and became free after 2011. It was developed by Apple.
- **WMA –**
  It stands for Windows Media Audio. But it is least efficient in term of compression and is not open-source. It has limited hardware support.

MIDI under Windows environment-

- In windows, system sounds are WAV files, and they reside in the Windows/Media subdirectory. Available system event sounds include start.wav, chimes.wav, ding.wav, logpff.wav, notify.wav, recycle.wav, tada.wav, and the Microsoft sound.wav which plays when Windows starts up.

Unit – III

Macromedia Products-

Educational Products:

- Educational multimedia products can have an impact on learning that is greater than that of a lecture or talk. Some people argue that they inhibit a person's creative thoughts, as they are focused on many senses at the same time. These products should be seen as a helpful supplementary resource, instead of a substitute for the interaction between a teacher and a student.

Interactive CD-ROMs:

- Multimedia resources have been used in classrooms for a number of years. One of the first multimedia CD-ROMs was Microsoft's encyclopaedia, Encarta®. This resource let student's access text, video clips and audio from significant instances in history.

Multimedia Presentations:

- Microsoft PowerPoint® allows users to create slides with interactive elements (e.g. animations, web links, and movies). PowerPoint® can be used effectively to add a visual interest to talks, but there is an issue that many people choose the default templates for their presentation, resulting in many similar displays. Presentation software is the most widely used multimedia application.

Computer Based Training:

- Computer based training (CBT) uses multimedia to assist user in learning about a topic, or teaching skills to others in the workplace. Someone can receive training on the operation of machinery, or office procedures from CBF. An advantage of CBT over other types of training is that users can retrace their steps as many times as they want, to reaffirm their understanding.

Entertainment products:

- Entertainment drives advancements in computing, and multimedia is an example of this. Games have become one of the most popular applications of multimedia. Early games consisted of either 2-dimensional platform games or computerised copies of board games.

Multimedia games:

- Today, games have entered a 3rd dimension, where the user can control the camera angle as well, as well as the characters direction and speed. These types of games can have dramatic and use realistic sound effects, and can have complex puzzles that require solving and can immerse the player in a real-world environment. As gaming consoles become more sophisticated, the realism of their graphics increase.

Basic drawing techniques-

When drawing, the following drawing instruments are available: point, line, area, and the tonal values (light and dark). These drawing instruments are used to create a drawing using the appropriate drawing technique and the appropriate drawing tool. The most common drawing tools are graphite pencil, ink pen, charcoal and crayons. On this page you can learn more about the different drawing techniques:

- The line
- Hatching
- Smudging
- Washes
- Combined techniques
- Graffito

Point and line - basis of each drawing:

- Point and line are the basic drawing instruments. The line marks the outline of a motif. It is used as a basic technique for drawing, to represent the boundaries and the outline of objects. With it, contrasts

can be depicted and pointed out. In addition you can also use the point as a drawing instrument.

The most important techniques in drawing:

- The hatching is a classic drawing technique which makes it possible to draw and form the surfaces of a motif. Various effects can be achieved with the hatching technique. A good spatial effect results from the hatching, as well as different tonal values can be realized. If all gradations of a single Color are used, a plastically representation of the motif is created.

Advance animation techniques-

3D Animation technique:

- Frame rate is the number of frames used in an animation and how fast they will run.
- Student can lengthen or shorten an animation by adding Frames.
- Students can make adjustments to key frame for editing purposes.
- Student can set the frame rate and number of frames.
    - 24 frames per second are used for editing motion-picture film.
    - 25 frames per second are used for editing PAL.
    - 30 (29.97) frames per second is used for editing **NTSC** video.

Unit – IV

Digital Audio concept-

- Digital audio is a technology that is used to record, store, manipulate, generate and reproduce sound using audio signals that have been encoded in digital form.
- It also refers to the sequence of discreet samples that are taken from an analog audio waveform. Instead of a continuous sinusoidal wave, digital audio is composed of discreet points which represent the amplitude of the waveform approximately.

Sampling Variables-

- Variable sampling is used for measurement of hardness, tensile strength, resistance and other physical properties of the desired sample. The variables used for measurement are on a continuous scale and the limits for rejection are clearly demarcated for the entire range.
- The sample which is tested from the complete lot is said to be its representative.

Loss Less compression of sound-

- Lossless formats use compression algorithms that preserve audio data so the audio is exactly the same as the original source. This contrasts with lossy audio formats such as AAC, MP3, and WMA, which compress audio using algorithms that discard data.

Examples of popular lossless formats used for storing music include:

- FLAC
- WAV
- ALAC
- WMA Lossless

Lossy compression & Silence compression-

- **Lossless compression** as their name implies, involve no loss of information. If data have been losslessly compressed, the original data can be recovered exactly from the compressed data. Lossless compression is generally used for applications that cannot tolerate any difference between the original and reconstructed data.
- **Silence compression** provides a way to squeeze redundancy out of sound files. The silence compression scheme is essential for efficient communication systems. It allows significant reduction of transmission bandwidth during a period of silence.

Unit – V

Multimedia monitor bitmaps-

- Bitmap (BMP) is an image file format that can be used to create and store computer graphics. A bitmap file displays a small dots in a pattern that, when viewed from afar, creates an overall image. A bitmap image is a grid made of rows and columns where a specific cell is given a value that fills it in or leaves it blank, thus creating an image out of the data.

Explains Bitmap:

- To create a bitmap, an image is broken into the smallest possible units (pixels) and then the Color information of each pixel (Color depth) is stored in bits that are mapped out in rows and columns. The complexity of a bitmap image can be increased by varying the Color intensity of each dot or by increasing the number of rows and columns used to create the image.

Vector drawing-

- Vector graphics is the creation of digital images through a sequence of commands or mathematical statements that place lines and shapes in a given two-dimensional or three dimensional space.
- In physics, a vector is a representation of both a quantity and a direction at the same time. In vector graphics, the file that results from a graphic artist's work is created and saved as a sequence of vector statements.

Lossy graphic compression-

- Lossy compression refers to compression in which some of the data from the original file (JPEG) is lost. The process is irreversible, once you convert to lossy, you can’t go back.

Lossy advantages and disadvantages

Advantages: Very small file sizes and lots of tools, plugins, and software support it.

Disadvantages: Quality degrades with higher ratio of compression. Can't get original back after compressing.

Image file formatic animations Image Standards-

- There are three image formats in constant use on the net — GIF, JPG and PNG. Each is suited to a specific type of image, and matching your image to the correct format should result in a small, fast-loading graphic. Saving and exporting into these formats will require a decent image editor.
- When choosing the format for your image, you should always be conscious of both the image's quality and file size.

JPEG compression-

- JPEG is an image compression standard which was developed by "Joint Photographic Experts Group". In 1992, it was accepted as an international standard. JPEG is a lossy image compression method. JPEG compression uses the DCT (Discrete Cosine Transform) method for coding transformation. It allows a trade-off between storage size and the degree of compression can be adjusted.

Zig Zag coding-

- Zig Zag code is a type of introduced. They are defined by partitioning the input data into segments of fixed size, and adding sequence of check bits to the data, where each check bit is the of the bits in a single segment and of the previous check bit in the sequence.

Video representation-

- In this sub-section we discuss the video representation for both compressed and uncompressed data. We first explore the additional dimensionality of video data and frame-rates with their associated redundancy in uncompressed data. Then, we discuss the compressed data representation and the techniques of reducing the various types of redundancies, and how that can be utilized for shot-detection.

1) Uncompressed Video Data

- The video sequence contains groups of successive frames. They are designed so that when they are played back, the human eye perceives continuous motion of objects within the video and no flickers are recognized due to the change from one frame to another.
- The film industry uses a frame-rate of 24 frames/sec for films. But the most two common TV standard formats are PAL and NTSC. The frame rate in those two standards is either 25 frames/sec, for PAL TV standard or 30 frames/sec for the NTSC TV standard.
- In case of the videos that are converted from films, some care need to be taken, especially due to the different frame-rates involved in the different standards. A machine, called telecine, is usually used in that conversion that involves the 2:2 pull-down or 3:2 pull-down process for PAL or NTSC respectively.

2) Compressed Video Data

- Video compression aims to reduce the redundancy exist in video data, with minimum visual effect on the video. This is useful in multimedia storage and transmission, among others. The compression can be applied on one or more of the video dimensions; spatial and/or temporal. Each of them is described, with focus on the MPEG standards

Colors-

- Colors are composed of the primary Colors- red, green and blue, 24-bit Colors are sometimes stored as 3 sets of 8 bits. This is referred to as rgb encoding. Another techniques, especially for 8-bitcolor, is to choose a palette. That is, a set of Colors is chosen to be used for the picture.

Video compression-

- Video Compression is the term used to define a method for reducing the data used to encode digital video content. This reduction in data translates to benefits such as smaller storage requirements and lower transmission bandwidth requirements, for a clip of video content.

Video compression may be lossy, in which case the image quality is reduced compared to the original image. For lossy compression, the goal is to develop compression techniques that are efficient and result in perceptually lossless quality. In effect, even though the compressed video is different from the original uncompressed video, the differences are not easily visible to the human eye.

MPEG standards-

- Stands for "Moving Picture Experts Group." MPEG is an organization that develops standards for encoding digital audio and video. It works with the International Organization for Standardization (ISO) and the International Electro technical Commission (IEC) to ensure media compression standards are widely adopted and universally available.

The MPEG organization has produced a number of digital media standards since its inception in 1998. Examples include:

- MPEG-1 – Audio/video standards designed for digital storage media (such as an MP3 file)
- MPEG-2 – Standards for digital television and DVD video
- MPEG-4 – Multimedia standards for the computers, mobile devices, and the web
- MPEG-7 – Standards for the description and search of multimedia content
- MPEG-MAR – A mixed reality and augmented reality reference model
- MPEG-DASH – Standards that provide solutions for streaming multimedia data over HTTP (such as servers and CDNs)

Recent development in Multimedia-

- Multimedia and networking technologies have significantly impacted on our daily activities. Multimedia environments have the vision of enhancing our everyday environment and interaction through sensing, computing, and communication capabilities.
- It focuses on Indexing of Large-Scale Multimedia Signals, Multimedia and Big Data, Multimedia Applications in Cloud Computing, Secure

Multimedia Transmission, and Secure Multi-party Computation for Big Multimedia.

- Latest multimedia research includes in medical image processing, digital library, remote surveillance, network resource management, mobile communications, emerging technologies such as wireless sensor and mesh networks, and innovative applications in learning, business, games, archaeology and art.