CONTENT, Project Planning, Designing & Development:- ①

A multimedia project by definition is a combination of text, audio, still images, animation, video and interactive content form. There is a lot to think about when planning a multimedia project.

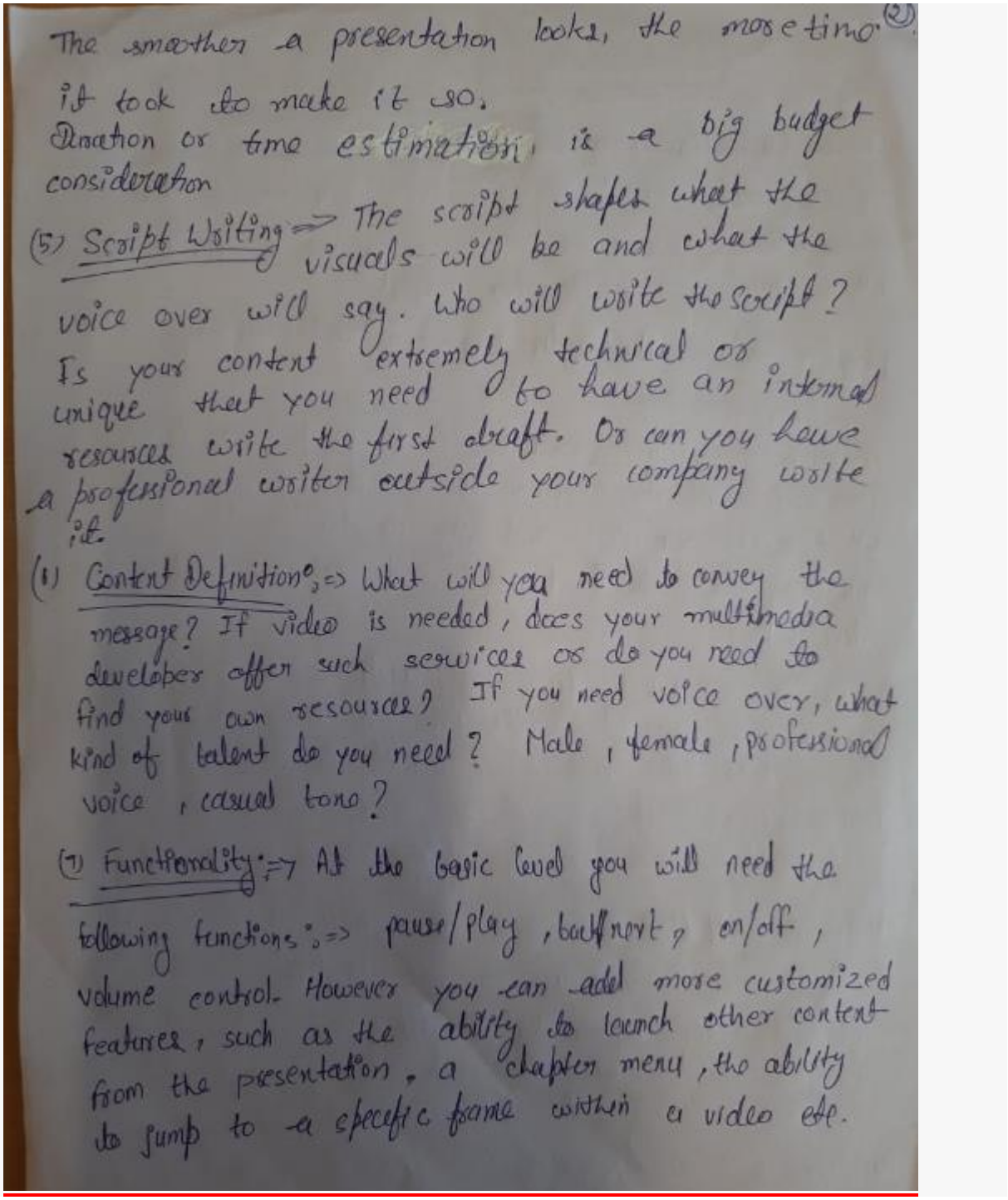
Planning Steps => Multimedia Project needs the following steps for processing.

(1) Purpose Definition => What is the purpose of developing a project must be known to the developer. What is the feasibility and why to develop it is a question that should be answered before starting the development.

(2) Audience => What type of audience is going to watch your project is the next necessity that you must know. Who will watch it and whether someone from your company will be there to present the information need to be defined and agreed to.

(3) Delivery Method => is that you must know is what media will you use for distributing the project. A multimedia representation delivered on a CD can be much more involved than one to be delivered online .. due to file size consideration.

(4) Time Estimation => Creating smooth transitions from one message to another is time consuming.

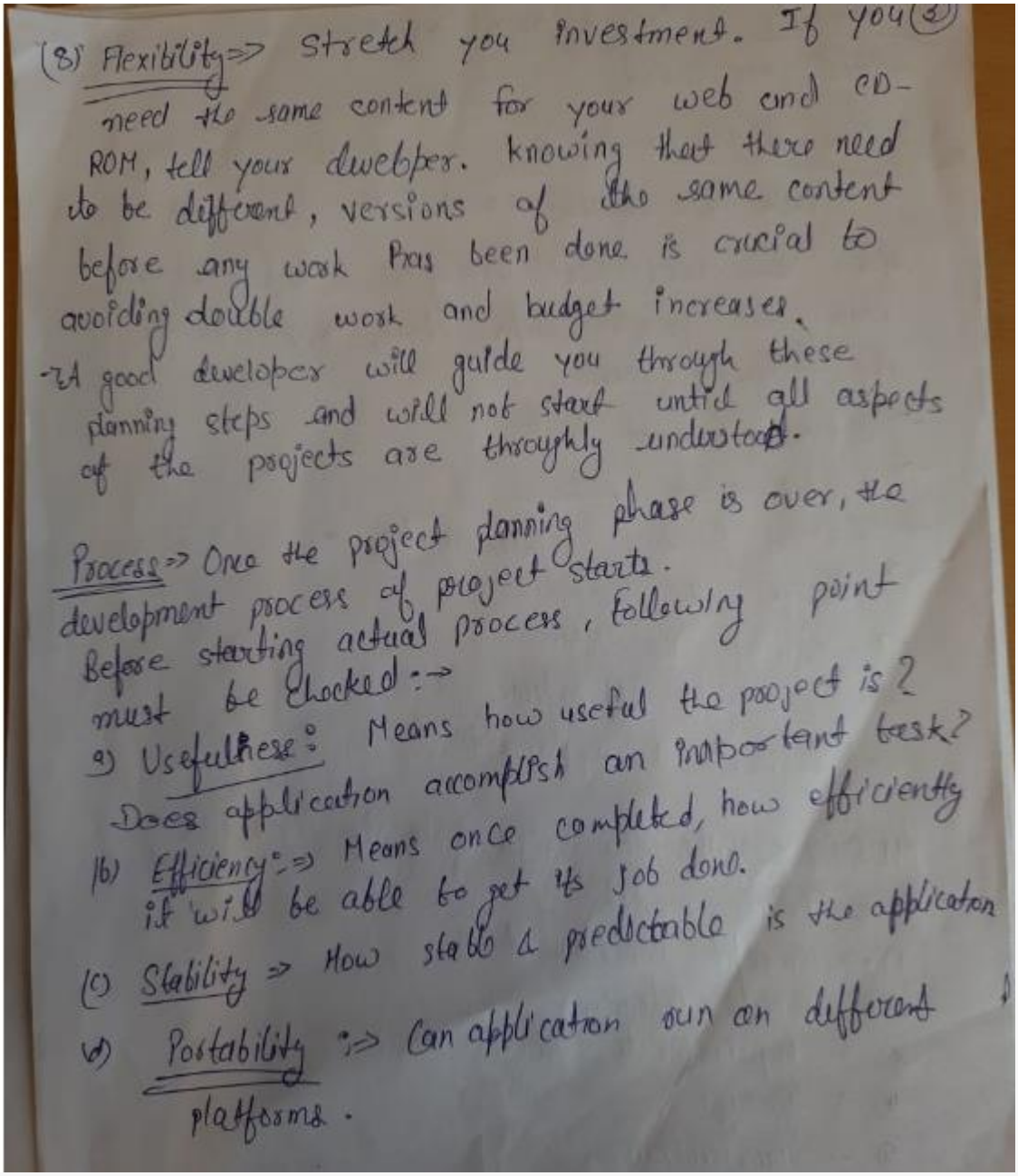


The smoother a presentation looks, the more time it took to make it so. (2)
Duration or time estimation, is a big budget consideration

(5) Script Writing => The script shapes what the visuals will be and what the voice over will say. Who will write the script? Is your content extremely technical or unique that you need to have an internal resources write the first draft. Or can you have a professional writer outside your company write it.

(1) Content Definition => What will you need to convey the message? If video is needed, does your multimedia developer offer such services or do you need to find your own resources? If you need voice over, what kind of talent do you need? Male, female, professional voice, casual tone?

(7) Functionality => At the basic level you will need the following functions => pause/play, back/next, on/off, volume control. However you can add more customized features, such as the ability to launch other content from the presentation, a chapter menu, the ability to jump to a specific frame within a video etc.



(8) Flexibility => Stretch you investment. If you need the same content for your web and CD-ROM, tell your developer. knowing that there need to be different, versions of the same content before any work has been done is crucial to avoiding double work and budget increases.
- A good developer will guide you through these planning steps and will not start until all aspects of the projects are throughly understood.

Process => Once the project planning phase is over, the development process of project starts.
Before starting actual process, following point must be checked :->

a) Usefulness: Means how useful the project is? Does application accomplish an important task?

b) Efficiency :=> Means once completed, how efficiently it will be able to get its job done.

(c) Stability => How stable & predictable is the application

d) Portability :=> Can application run on different platforms.

(e) Scalability => Can additional functions be added on readily. (20)

(f) Ease of Use => Do users find it easy or hard to make the application work. Do they like using it?

After the theoretical testing (above steps) of the plan the process steps start, They include the following points :->

-> Determine Project Goal.
-> Develop Work Space.
-> Assess System Requirements.
-> Design the system.
-> Develop the System.
-> Test the application.
-> Deliver the Application

MUDPY (Multimedia Design & Planning Pyramid) :=> 6 a 5 level model.

1) -> Concept Development
2) -> Goals Definition
3) -> Requirements / Target Audience
4) -> Design
5) -> Production

Concept -> should give the complete overview of the entire project. (5)

Goals => can be termed as Aim & a list of objectives
- should be short statement that explain the purpose of project.

Requirements => refer to the task that the system must perform.

(1) Concept Development => A complete specification explains the audience, concept & purpose for the title.
- => It means defining the theme and aim of the project.

Explain the idea on which the project is based.

(2) Defining Project Goals & Objectives :=> After theme finalize goals must be laid down

Goals => are general statement of anticipated project outcomes. They are usually more global in scope.

Objective :=> Includes specific statements of anticipated project outcomes. They define what are the outcomes required by the project.

The following questions need to be addressed -> (6)

-> What is the purpose of the proposed title?
-> What is the team trying to accomplish
-> What are the expected results.

(3) Defining the Target Audience => Target audience means defining the audience category who will be the viewer of the outcome of the project.

-> A very important element that needs to be defined at this stage is the potential target audience of the proposed title, since this will determine how the contents need to be presented.

For ex- > Multimedia games demand fun, imagination effects.

> A conference (business) related to Scientific research, will avoid cute animation & sounds.

(4) Design => Once the target audience is defined you are almost complete with all sort of analysis & definitions. In this phase design of the project is prepared. It starts with storyboard of the project & which infact is something like script writing for your project

(7)

(4) A detailed storyboard of project is prepared which defines everything about what appears on each screens, what media is needed, what text & graphics are used etc in a stepwise manner.

(5) Production => This is the last and final phase that helps you to implement the plans & design of your project in previous steps.
Considering all the plannings, scripts, stories and other aids a working project is prepared. in this phase in form of a functional model.
This functional model is then tested using various testing techniques like internal testing, alph testing focus group testing, beta testing etc.
In fact Production phase is one in which your design is executed.

CONCEPT OF DATA COMPRESSION=> Data Compression is a common term that indicates reduction of size of anything. In the multimedia applications the data elements like images, videos, clips, sound, animation

etc. are all in need of a lot of space.
So comes the need of reduction of this storage requirement.

Compression technique solve this problem
It is a technique to store the elelements in less memory space.

Generally three basic concepts are used to explain compression :=>

-> Compression Ratio
-> Compression Quality
-> Compression / Decompression Speed.

Compression Ratio => It represents the ratio of size of original data to the size of compressed data. It basically explains how much the data is actually compressed.

Compression Quality :=> The quality explain whether a compression is lossy or lossless.

-> Lossy compression results into some data loss during compression.
- ex during the compression of an image a part of it was lost and may not be recovered even after decompression. In lossy compression image quality decreased.

→ Lossless Compression => the original data is preserved precisely resulting into good quality decompressed image.

⊙ Higher is the compression ratio lower is the quality of decompressed image.

⊙ lower the compression ratio & higher is the quality

Compression / Decompression Speed is related to the time taken in compressing or decompressing the data stream.

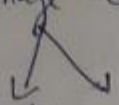
No doubt, fast compression and decompression ~~time~~ is good to reduce the development time & increase the display performance.

Types of Data Compression => 1) Image Compression
2) Video Compression
3) Audio Compression

Image Data Compression => An image needs a large amount of memory specially when stored as bitmapping. This requirement can be reduced by using compression of an image.

An image can be stored to $\frac{1}{50}$ th of the memory space as required by the original image. (10)

To compress an image, need conversion into different formats.. bcoz image can be



graphics image — digitized Image.

Graphic image is stored as a program in a graphic language & needs less memory.

Digitalized image is stored as a two dimensional matrix of picture elements.

The most common method used for compression of graphic images is GIF (Graphical Interchange format).

All compression algorithm used static and dynamic Huffman coding, arithmetic coding & LZW coding algorithms.

(2) Audio Compression => For audio compression the stereo sound is first converted into digital sound & then only it can be compressed.

(IV)

- With audio compression technique one can store the sound in 1/8th the space but at the same time some quality is lost due to the rounding off effects of quantization.

Algorithms used for audio compression are Differential Pulse Code Modulation, Adaptive differential PCM. etc.

Compression can be either software base or hardware based.

- H/W compression needs audio cards & offer speed.
- S/W compression have enough flexibility but it sacrifies on speed.

(C) Video Compression ⇒ Video clip is basically a group of frames and each frame requires a lot of memory space (about 7 megabit for each frame)

This requirement can be reduced by compression of data. i.e., compression of video.

- Video compression can be done by removing the repetition of pattern from the frames. For moving video clip this can be done easily.
- Compression affects the quality to some extent but it saves a lot of storage so one

can compromise at that point. (12)

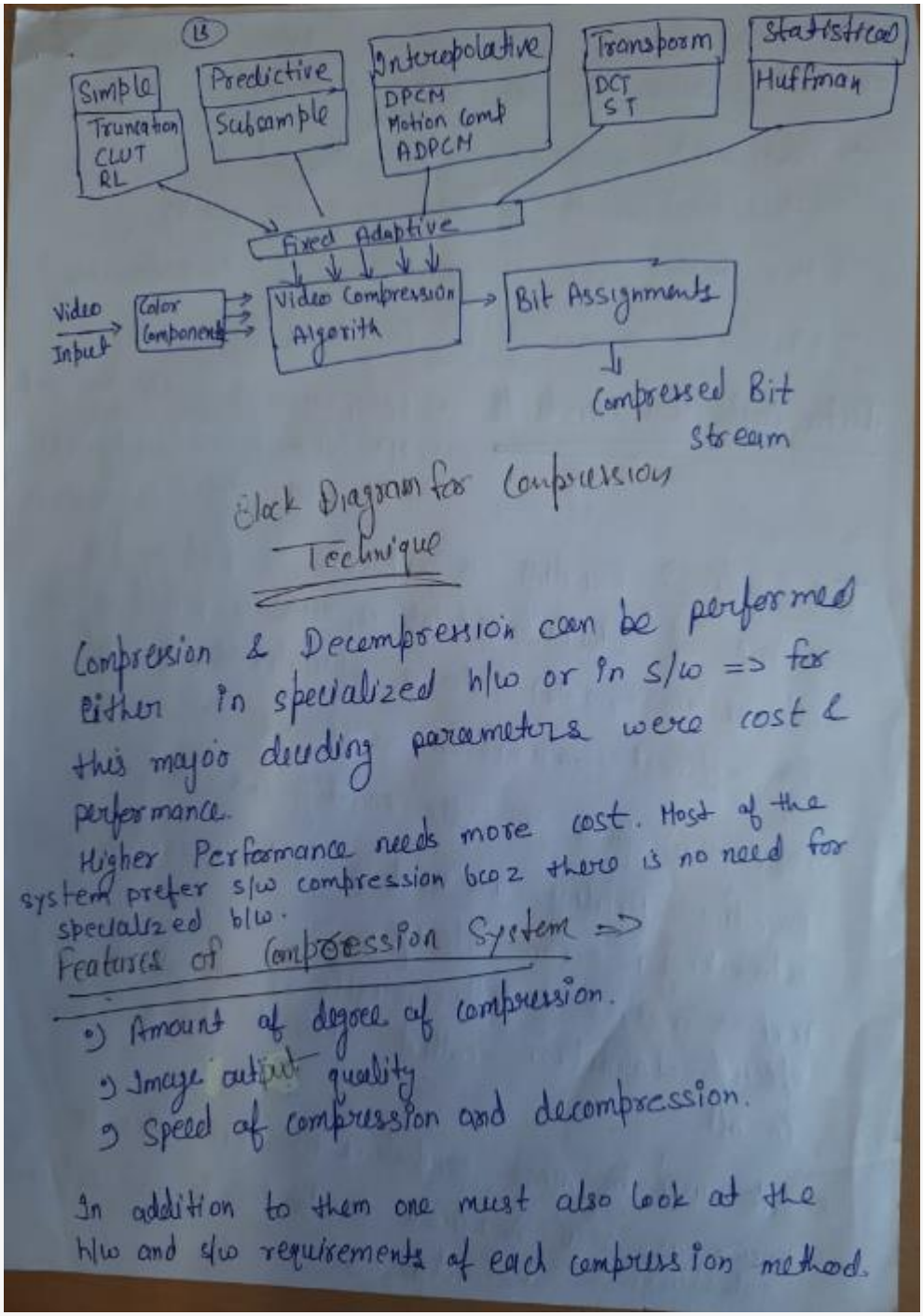
- Various format for video compression are MPEG, FIC and DVI formats.
- CODECs are digital video compression schemes.
- Various real time video compression algoriths such as MPEG, Indeo, JPEG, Cinepak and sorenson etc are available.
- In Still video → compression & decompression speed are not much important
- In motion video speed is not so minor, rather the speed issue become overwhelming

Compression Techniques

In general we classify a compression technique in following categories.

- Simple Compression Technique
- Interopolative Compression.
- Predictive Compression.
- Transform Compression
- Statistical Compression.

The block diagram shows how these techniques are used to create a compression algorithm for video compression or image compression.



Block Diagram for Compression Technique

Compression & Decompression can be performed either in specialized h/w or in s/w => for this major deciding parameters were cost & performance.

Higher Performance needs more cost. Most of the system prefer s/w compression bcoz there is no need for specialized h/w.

Features of Compression System =>

1) Amount of degree of compression.
2) Image output quality
3) Speed of compression and decompression.

In addition to them one must also look at the h/w and s/w requirements of each compression method.

Thus various factors that should be taken care of while evaluating compression technique are:-

- How much compression is obtained ?
- How good is the picture or audio quality. ?
- How fast does it compresses or decompresses ?
- What h/w & s/w does it take ?

Data Compression Standards
- JPEG (Joint photograph Expert Group)
- MPEG (Motion Picture Expert group)
- DVI (Digital Video Interactive)

Text Encoding: Encoding is a process of putting a sequence of characters (letters, numbers, punctuation and certain symbols) into a specialized format for efficient transmission or storage.

Decoding is opposite to the encoding process.

Encoding & Decoding are used in data communications, networking, and storage.

- Text → consist of letters, digits, punctuations, and special characters called abstract characters in all.
- Code used by most computers for text files is known as ASCII (American Standard Code for Information Interchange).

· What appers to you as text on the screen is actually stored as numeric values in the text file. Computer translate the numeric values into visible characters. This is done by using encoding standard.

Other commonly used code include :->

-> Unicode :-> it a system for the interchange processing and display of written.

Support many classical and historical texts in a number of languages. It contains 34168 distinct coded characters of 24 supported language scripts.

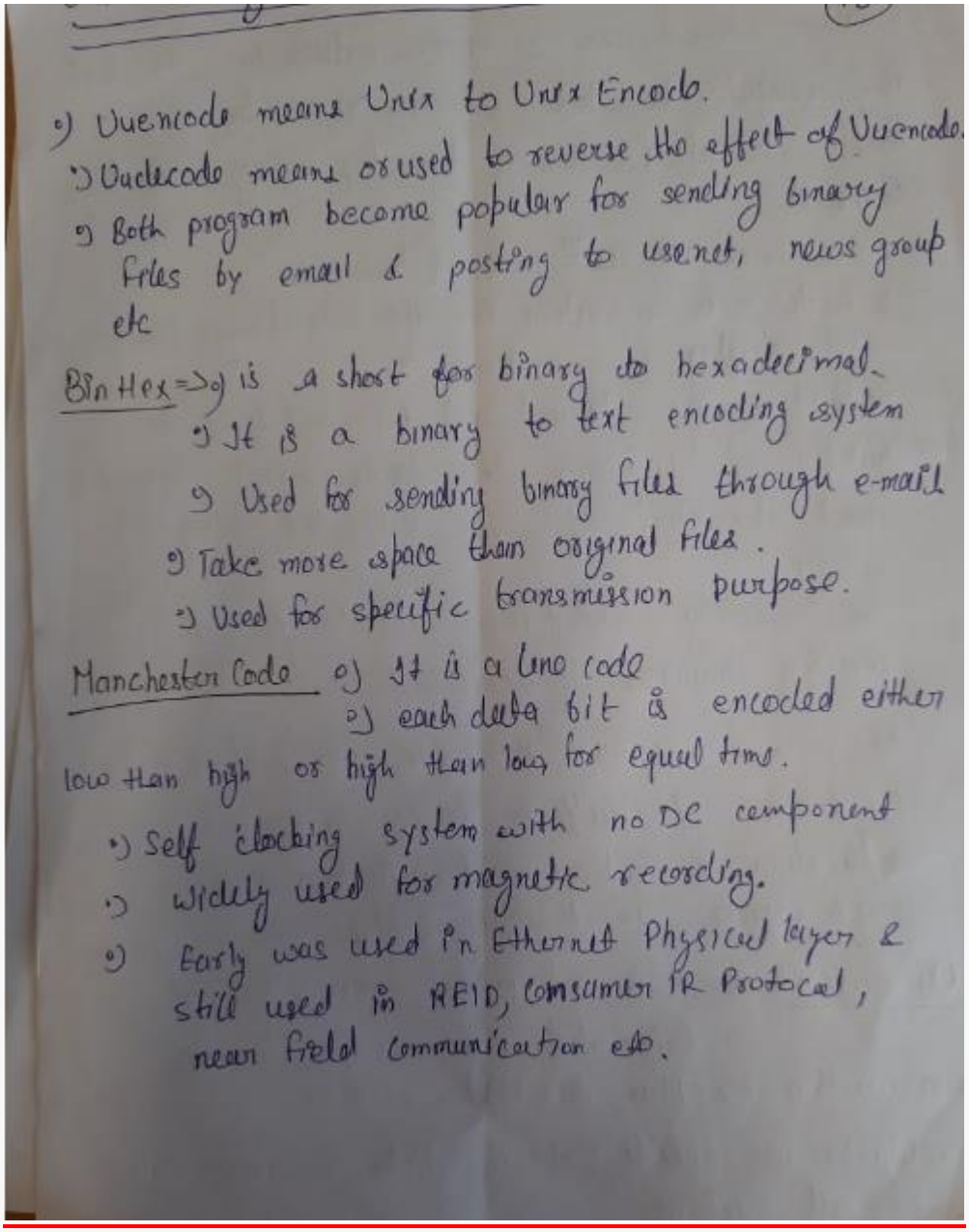
This encoding method cover all the principle written languages of the world.

It provide a unique no. for every character Prospective of platform, device, language or application. It support all major operating systems, search engines, smart phones, laptops, internet etc.

Uuencoding :-> ◦) is a form of binary encoding.

◦) Originated in unix program & was written by Mary Ann Horton in 1980.

◦) Written for encoding binary data for transmission in email system.



Audio Encoding is the process of changing digital audio from one format to another. The way that digital files are encoded plays a big part in the quality of the audio. In audio encoding the audio signals are translated into digital form.

There are two broad types of formats - **uncompressed** and **compressed**.

- Uncompressed audio is mainly found in the PCM format of audio CDs. Generally, audio encoding means going from uncompressed PCM, to some kind of compressed audio format. These files take up a lot more digital space.
    - Example:-WAV file format, AIFF file format
- Compressed audio is split into two groups, **lossless** and **lossy**.
    - Lossless audio can be decoded back into the exact uncompressed audio you started with. This is useful for archiving audio at the highest

quality possible, and for people for whom storage space is not an issue. Allow reconstruction of data.

- Used for text , program, sounds, images.
- Example→FLAC, ALAC, APE.

- Lossy compression involves some *loss of information* but consumes less space.

- Used for imade Audio and Video.
- Example:→MP3, AAC,OGG, etc.

SOME COMMON AUDIO FORMATS:

Uncompressed	**Compressed - Lossless**	**Compressed - Lossy**
Audio CD	Apple Lossless Audio	Mp3
Audio DVD	TTA	AAC
PCM WAV and AIFF	FLAC	WMA
Vinyl Record	Monkey's Audio	Mini Disc
Cassette		Shorten
DAT	WavPack	

IMAGE:→ An image, digital image, or still image is a binary representation of visual information, such as drawings, pictures, graphs, logos, or individual video frames.

Or We can say an image is an artifact ,for example 2 dimensional picture that has a similar appearance to some object-usually a physical object or a person.

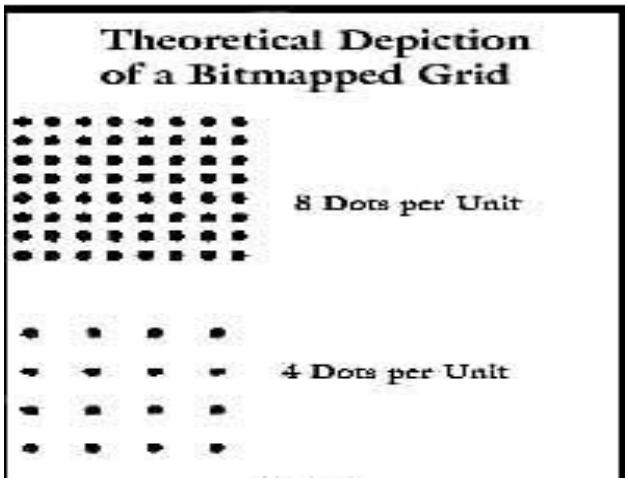
- An image on a screen is made up of dots called pixels. A pixel is the smallest part of the screen that can be controlled by the computer or other device.
- An image can be 2D like :→photograph, screen display etc. And 3D like:→a statue.
- Still Image:→is a single static image, visual representation that do not move.
- Moving Image:→typically a movie or video.

IMAGE TYPES:→

1) Bitmap image:→ A bitmap (also called "raster") graphic is created from rows of different colored pixels that together form an image. In their simplest form, bitmaps have only two colors, with each pixel being either black or white. With increasing complexity, an image can include more colors; photograph-quality images may have millions. Examples of bitmap graphic formats include GIF, JPEG, PNG, TIFF, XBM, BMP, and PCX as well as bitmap (i.e., screen) fonts. The image displayed on a computer monitor is also a bitmap, as are the outputs of printers, scanners, and similar devices. They are created using paint programs like Adobe Photoshop.

- Made up of pixels or bits(binary digits) of information arranged on a grid.

- Each bit can b visualized as a dot.
- Resolution:-Number of pixels per unit of measurement, example, ppi(pixel per inch) or dpi(dots per inch). Determine the resolution of image.
- Also called raster image.
- It can be stated that when one draw a line ,one is covering pixels.
- Raster images are based on pixels and thus scale with loss of clarity



2) Vector Graphics Image:→Are mathematical arrangements of points and these points are connected by mathematical formula. Thus image can be shrunk and stretched without changing the initial quality of the image.

- All of the images are made by straight lines connected at the nodes or points. However one can create a curve that is absolutely smooth.
- Vector images are resolution independent as made by mathematical formula.
- Size of files in vector based program will always be smaller than in a bitmap based program.
- Both 3-D graphics and CAD (computer-aided design) technology rely heavily on vector graphics.

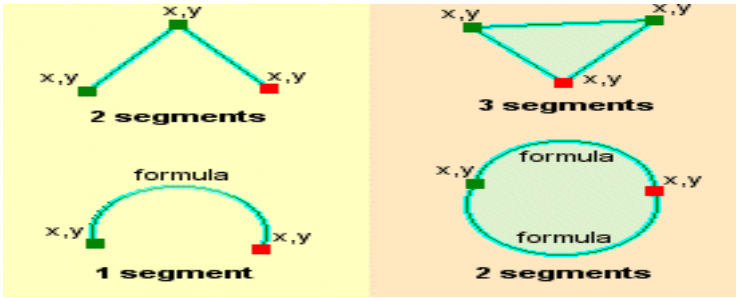


Image Cappturing:→ **image capture (image acquisition)** The process of obtaining a digital image from an electronic device such as a camera or scanner.

Image Capturing by Scanner:→ An image scanner is able to scan and capture text, imagery and objects and then turn them into a digital image,

the most common scanners are flatbeds, this involves the object or document being placed on a horizontal glass surface.

Steps of image capturing by scanner:

1) Connecting a scanner:→

- Install the software drivers and scanning s/w that come with your scanner.
- Restart your computer.
- Connect Scanner with the Computer with the help of the given port.
- Turn on your Computer.

2) Setting Your Scanner to Scan:→Scanning and scanner s/w's differ from model to model. But we have some steps that show the basics of manually scanning an item into your computer.

1. Place a document face-down in your scanner. You'll also want to make sure that your scanner is on and connected to your computer before proceeding.
2. Open the scanning application that come with your scanner and click preview. A preview window of scan will open.
3. Use crop box to frame the exact area that you wish to scan.
4. You can set the image type, size, and other options from the settings.
5. Decide on your document's color. Click the "Color format" drop-down box, then select either Color or Black and White. Your scanner may also have different options for colors here.
6. For Destination Choose, where the scan will ultimately be used.
7. Choose the resolution.
8. Select a file type. Click the "Format" drop-down box, then click a file type (e.g., PDF or JPEG) that you want to use to save your file.
9. You can also enter size dimensions of the image with the help of scaling bar.
10. When finished click, Scan to scan he document.
11. Your document will begin scanning into your computer using your selected options and format.

Image Capturing by digital Camera:➔

- Digital Cameras like scanners are capable of image capture, except a digital camera is more transportable making them the preferable choice; this is also down to the fact that a Digital Camera is able to capture images of everyday life compared to the Scanner which requires invariably a flat document.
- Digital Cameras capture the image and then immediately present the image on the camera, the majority of modern cameras allow you to edit or filter images that have been stored.
- Digital camera comes in wide range of shape and size making them suited to some tasks but not to others.

- For example while using a compact digital camera is ideal for occasional photo on location it would be hopeless when using in a formal photographic studio to capture a painting.
- digital camera is a camera that captures photographs in digital memory
- However, unlike film cameras, digital cameras can display images on a screen immediately after being recorded, and store and delete images from memory.
- The two major types of digital image sensor are CCD(Charged Couple Device) and CMOS(Complementary Metal Oxide Semiconductor).. A CCD sensor has one amplifier for all the pixels, while each pixel in a CMOS active-pixel sensor has its own amplifier. Compared to CCDs, CMOS sensors use less power.

Coding Technique for moving picture:→In moving pictures coding system use multiple reference pictures.

MPEG4 is an ISO/ICE standard developed by MPEG, the committee that also developed the Emmy Award winning standards know as MPEG-1 and MPEG-2.These standards made interactive videos on CD-ROM and Digital Television possible.MPEG-4 is the result of another international effort involving hundreds of researchers and engineers from all over the world.

MPEG-4 builds on the proven success of three fields:→

- Digital television
- Interactive graphics applications (synthetic content).
- Interactive multimedia (WWW, distribution of and access to content).

MPEG4 provides the standardized technological elements enabling the integration of the production, distribution and content access paradigms of the three fields. The MPEG-4 standard provides a set of technologies to satisfy the needs of authors, service providers and end-users. We find primitive media objects, such as:

- ❖ Still images

- ❖ Video objects
- ❖ Audio objects
- ❖ MPEG-4 standardizes a number of such primitive media objects, capable of representing both content types.

Media elements may need streaming data, which is conveyed in one or more elementary streams. Each stream itself is a characterised by a set of descriptor for configuration information e.g., to determine the required decoder resources and the precision of encoded timing information. Descriptors may carry hints to the Quality of Services (QOS) it request for transmission (bit rate , bit error rate, priority, etc)..

Image Editing:➔ Image editing refers to modifying or improving digital or traditional photographic images using different techniques, tools or software. Image Editors and illustrator software are the two primary categories of graphics s/w.

A)Image editor (pixel/bitmap-based): →

1. Also known as paint application (most popular type of graphics application).

2. Allow you to receate bitmap based images from scratch with a variety of painting tools.
3. Almost all image editing software includes features for photo enhancement and retouching as well. Image editors are used to edit digital photos and scanned images and for creating continuous –tone and photo realistic artwork.
4. Advantages is that you can get a great deals of details, as much as a photograph.
5. Some image editing programs:--Adobe Photoshop, Corel Paint Shop Pro photo, Corel Painter, Corel Photo Paint, Microsoft paint.

B)Illustration Software(vector based):→

1. Allow to create drawings using lines and curves.
2. These lines are called vector illustration.
3. Can be easily edited by moving points, adjusting curves and changing the colors of various objects.
4. Free from the combine of pixel resolution.
5. Give the printed output with smooth fills and crisp line no matter what is the size you print.
6. Vector graphics can't contain high level details as bitmapped images so they have a cartoon like appearance.
7. Mostly used to create stylized, cartoon-like image, logos, maps and other design elements that need output at any size.
8. Examples:--Adobe Illustrator, CorelDRAW, Xara X, Macromedia Freehand.

C)Object –Based Graphics Software:→The tools provided in the software alow you to work on a pixel editing basis or on a vector editing basis.For example :-photoshop which is categorized as an image editor , has tools that allow you to create vector based path, shape and text.

Audio Editing:→ **Audio editing** is the process of manipulating **audio** to alter length, speed, and volume or to create additional versions such as loops. **Audio editing** is almost always done using a computer and **audio editing** software.

Some steps of audio editing:--

(a) **Navigation review:** The basic methods for navigating within a track: click anywhere on the ruler to place the playhead at a specific moment. You can also drag the playhead to any point on the ruler. To jump to the beginning of the project, press the **Return, Enter or z** key any time. Press the Spacebar to start or stop the playhead.

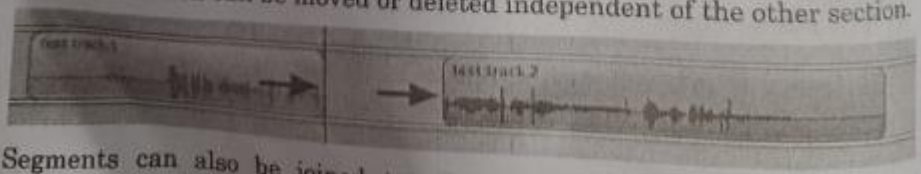
(b) **Selecting a segment:** If you click once on an audio segment in the Timeline, you will highlight it (it will be a darker color when you click it, or purple in this case below).

(c) **Dragging:** If you click and hold, you can drag the segment left and right along the timeline. You can also drag the selected segment up or down to other tracks.

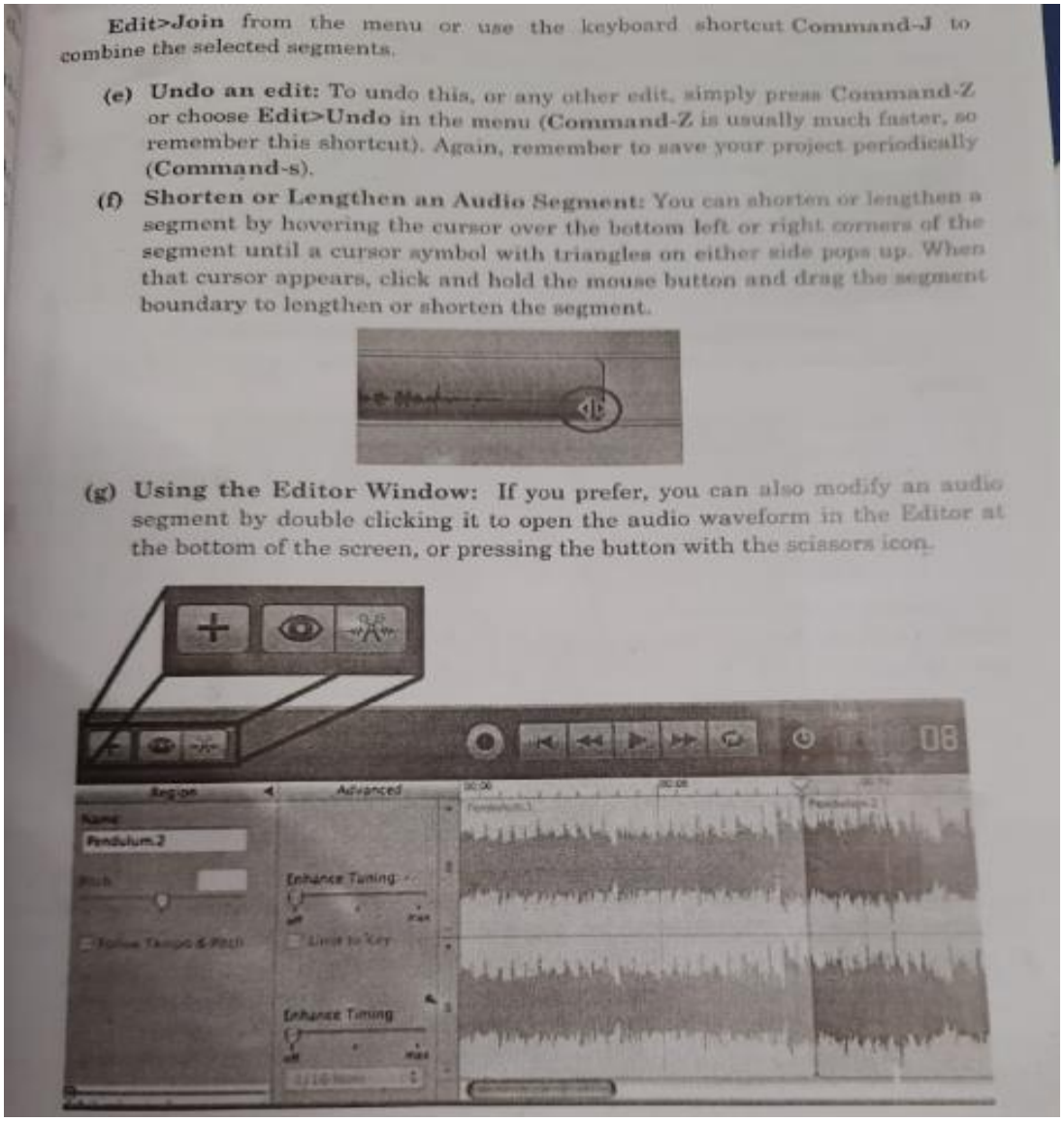
(d) **Split or join:** Move the playhead to a point where you want to split an existing single segment into two segments. Then select the segment. The segment will turn blue as in the image below.

From the GarageBand menu select **Edit>Split or use the keyboard shortcut Command-T.** This splits the segment into two pieces, and renames the segments in their upper left corners, in this case, "test track" becomes "test track.1" and "test track.2".

Click off of the segments to deselect both, and then click to highlight one segment. That section can be moved or deleted independent of the other section.



Segments can also be joined together. Highlight two or more consecutive segments by holding **Shift** while clicking each consecutive segment. Then choo



Text Editing:→A multimedia project includes various text messages in it. The insertion of text is done as per story and script. Font editing tools are used for text editing in the project.

Text editing tools:→

- **A text editor** (like notepad) is useful for making quick changes and quick typing of the text and it a great tool to write out HTML code.
- **A word processor** (like MS Word) has a plethora of options with which one can format the text and can insert special symbols, colours, line spacing and a whole lot of other things that can't do with a normal text editor.
- **Fontographer** (sometimes abbreviated FOG), is a software application used to create digital fonts, available for both Microsoft Windows and Apple Macintosh platforms. It was originally developed by Altsys but is now owned by Font Lab Ltd.
- **Mapping Text:**
  Character mapping allows bullets, accented characters, and other curious characters

that are part of the extended character set on one platform to appear correctly when text is moved to the other platform.

Video Editing→Video editing is the process of manipulating video by rearranging different shots and scenes in order to create a whole new output. It can be as simple as stitching together different scenes and shots with simple video transitions, and can become as complicated as adding different computer-generated imagery (CGI), audio and tying together different elements.

Video is considered as a linear media (can view in a linear manner).Still image is a non linear media.

can be edit by using the two methods:--

Linear and non-linear editing

Non-linear editing is a non-destructive editing process. In video editing, the terms *'linear video editing'* and *'non-linear video editing'* have technical meanings, which can be explained as follows:

Linear video editing describes a process in which scenes are copied from one video tape to another, using two tape VCRs, in the order required. The new tape is thus created in a linear fashion. The disadvantage of this method is that it is not possible to insert or delete scenes from the new tape without re-copying all the subsequent scenes. Linear editing was the method originally used with analogue video tapes.

Non-linear video editing is achieved by loading the video material into a computer from analogue or digital tape. The editing process creates a new 'tape' by storing all the commands entered by the operator. This method allows the operator to cut, copy and paste scenes in any order and make any changes desired. At the completion of the editing process the computer can then build a new file by applying the commands to the original digital image stored on the disk. The original digital image on the disk is unchanged. The new video file can then be outputted to a video tape, attached to an email or posted to the web.

What is offline editing? In short, it's the stage where your raw footage is run through a program that transcodes it to have a lower resolution. You can then use that lower resolution footage to edit your film. Think of this as the storytelling stage. The editor focuses on the timing of the cuts, the pacing of story, and communicating emotions.

Online editing, better thought of as the finishing stage, is where you'll reconnect those low-resolution files to the original, full quality footage. This is also when color correction, effects work, final titles, and audio are brought into the film. It's at the end of the online stage that you export your completed film.

Graphic Editing:→Resigning and Resolution are 2 important graphics editing techniques.

1. Resizing:→Large digital images typically take up a lot of space so it makes sense to keep your images to a size appropriate to your purpose. As you resize the image you will want to be aware of the concept called aspect ratio. Aspect ratio is the ratio of image height to image width. Graphics artist measure height and width in pixels or less commonly, inches or centimetres.

2. Resolution:→It has to do with how much details is contained within the image . For example an image with a resolution of 640X480 is lower than that of 800X600.A lower resolution will save a lot of storage space and good for Internet Purpose. Tools such as Photoshop are designed for use by professionals who know graphics editing concepts such as slayering, strokes, and channels.

User Interface and Navigation:→ A user interface, also called a "UI" or simply an "interface," is the means in which a person controls a software application or hardware device. A good user interface provides a "user-friendly" experience, allowing the user to interact with the software or hardware in a natural and intuitive way. A common **example** of a hardware device with a **user interface** is a remote control.

The user interface of your application is everything that the user can see and interact with.

To design user interface certain interface elements are used.-

1) Input Controls:-include buttons, text fields, checkboxes, list boxes, dropdown, radio buttons and data fields.
2) Navigational Components:-includes icons, breadcrumbs slider fields,tags,search field, links, filters , menu etc.
3) Informational Components:-includes tooltips, progress bars, notifications, message boxes, modal window etc.
There is no limits of interface elements but above listed are those which are most commonly used.

User Interface Designing:→ It requires good understanding of users need. Steps for interface designing are:-

- Functionality Requirement gathering:→list of functionality required by the system to achieve the goal of a project is prepared.
- User & task analysis:→includes the answers of the typical questions like" what the user wants".
- Information architecture:→is the development of the process and information flow of system.
- Prototyping: →developments of wire frame in forms of paper prototype or simple interactive screens.
- Usability inspection:→simple inspection of user interface.(methods used like walkthrough, evaluation).
- Usability testing: →testing of prototype on actual user. It allows the designer to understand the reception of the design from the viewer's point.
- GUI Design: →means graphical users interface design. It is actual look and feel design of the final GUI. It uses some computer programming depending on type of interface to be created.
- Software maintenance: →after the deployment of a new interface the software maintenance is required to fix s/w bugs, upgrade system, change features etc.

Navigational Components:→Navigating a multimedia product means how users will navigate your product. Navigation is means that users to move around a multimedia product. Navigation design is very important for a multimedia product and websites success.

key points related to navigation are:→

- **Content-creation:→**content should be created properly. Creative ideas are combined with the purpose by websites to make it more valuable. Once the content is created properly the navigation is built to guide the user experience. Various navigation support contents are:-
  - **Menu**:-helps people visualise the information architecture.
  - **Breadcrumbs**:-like a chapter heading in a book .it gives situational context. Provide orientation to user as many of users don't land on the home page.
  - **Filters:→**Heavy sites and information are made manageable with the help of filters
  - **Links:→**help user make connections b/w related contents.

A well planned content should have natural information architecture:→information architecture is something that tells how a site's ideas are grouped & organised.

- **Placement:→**the placement of content is to place them at most visible areas. For example the most visible area for menu are:-
  - **across the top horizontally**
  - **vertically down the left side**

Horizontal navigator:--when list of link is displayed at the top of each page below the header or logo, but before the main contents, called horizontal navigation. The horizontal menu bar is easy to scan.

Vertical Navigation:→allow you to place link to other section of your website in an organized manner down to left or right side of a webpage. Sometime it is hidden inside a

menu icon on the top of the page. This system is very attractive as a huge numbers of links can be adjusted with a hidden mode option.

- **Clarity:**→clear writing always help people navigate clearly labled links , effective metaphors ,pre-recorded communication , start to finish messages all add clarity to designs.to provide clarity following things are required:--
    - **Information scent** :-the page should clearly communicate what follow.
    - **Progressive disclosure**:-offers short summaries With the option to expand more detailed content, thus allowing users to understand what is available and most appropriate option.

Use of Codes in Multimedia Applications:→

For multimedia applications and products the data encoding plays vital role. It provides uniqueness to data .Such 2 coding system used are:--

- ❖ Barcode
- ❖ OR code

Barcode:→ A barcode or bar code is a method of representing data in a visual, machine-readable form. Initially, barcodes represented data by varying the widths and spacing's of parallel lines. These barcodes, now commonly referred to as linear or one-dimensional (1D), can be scanned by special optical scanners, called barcode readers. Later, two-dimensional (2D) variants were developed, using rectangles, dots, hexagons and other geometric patterns, called matrix codes or 2D barcodes. 2D barcodes can be read or deconstructed using application software on mobile devices with inbuilt cameras, such as smartphones.

When barcodes were used to automate supermarket checkout systems, they became commercially successful.

1D or line barcodes are a series of lines used to store text information, such as product type , size, color etc. They appear on the top portion of Universal Product Code (UPC).

2D barcodes are more complex and can include more information about the product than just text. They may include quantity of product, image, its price etc. They cannot be scanned by linear barcode scanner. However smart phone or image scanner can be used to read them.

- The barcode was invented by Norman Joseph Woodland and Bernard Silver and patented in the US in 1951
- Barcode scanner was developed by NCR

Benefits of barcode:→1) Barcodes eliminate the possibility of human error. The occurrence of errors for manually entered data is significantly higher than that of barcodes.
2) Using a barcode system reduces employee training time. It takes only minutes to master the hand-held scanner for reading barcodes.
3) Barcodes save time
4) Barcodes reduce errors
5) Barcodes are not expensive to design and print.
6) Barcodes promote better decision making.
7) Immediate availability of data

QR Codes:→ A QR code (Quick Response code) is a type of matrix barcode (or two-dimensional barcode) first designed in 1994 for the automotive industry in Japan. A barcode is a machine-

readable optical label that contains information about the item to which it is attached.

- A QR code uses for standardized encoding modes i.e numeric, alphanumeric, binary/byte to efficiently store the data.
- The Quick Response system became popular outside the automotive industry due to its fast readability and greater storage capacity compared to standard UPC barcodes.
- Applications include product tracking, item identification, time tracking, document management, and general marketing
- A QR code consists of black squares arranged in a square grid on a white background, which can be read by an imaging device such as a camera, smartphone etc.
- The image can be appropriately interpreted. The required data is then extracted from patterns that are present in both horizontal and vertical components of the image.
- Provide easy access of information using smart phone or digital camera.

Types of QR Codes:→

1. Static QR Code
2. Dynamic QR Code

- **Static QR Code –** the information stored in this type of code is fixed, and it does not allow changing of the destination address of the data or URL once generated.
- With a **Dynamic QR code**, you can track data and you can edit your URL at any time to any other URL, this saves you time and money on printing. Also called unique QR Code.
- With a static QR, the user will go directly to your URL, however, data cannot be tracked and you are unable to edit your URL.

- QR codes are generated according to the business requirements.
- With a **Dynamic QR code**, you can track data and you can edit your URL at any time to any other URL, this saves you time and money on printing.
- With a static QR, the user will go directly to your URL, however, data cannot be tracked and you are unable to edit your URL.
- Example of personal QR Code:--If you're a student or new graduate, you're probably planning to attend some networking events and job fairs. It's always a good idea to bring your resume to these events in case you find the perfect job and want to apply. Go a step further and make it even easier to get hired by adding a QR Code to your resume. While other applicants will be left in a stack of papers, your resume has already been emailed to the hiring manager with the click of a button.

Coding Technique in moving picture:→In moving pictures coding system use multiple reference pictures.

MPEG4 is an ISO/ICE standard developed by MPEG, the committee that also developed the Emmy Award winning standards know as MPEG-1 and MPEG-2.These standards made interactive videos on CD-ROM and Digital Television possible.MPEG-4 is the result of another international effort involving hundreds of researchers and engineers from all over the world.

MPEG-4 builds on the proven success of three fields:→

- Digital television
- Interactive graphics applications (synthetic content).
- Interactive multimedia (WWW, distribution of and access to content).

MPEG4 provides the standardized technological elements enabling the integration of the production, distribution and content access paradigms of the three fields. The MPEG-4 standard provides a set of technologies to satisfy the needs of authors, service providers and end-users. We find primitive media objects, such as:

- Still images
- Video objects
- Audio objects
- MPEG-4 standardizes a number of such primitive media objects, capable of representing both content types.

Media elements may need streaming data, which is conveyed in one or more elementary streams. Each stream itself is a characterised by a set of descriptor for configuration information e.g., to determine the required decoder resources and the precision of encoded timing information. Descriptors may carry hints to the Quality of Services (QOS) it request for transmission (bit rate , bit error rate, priority, etc)..