Ecbe18- Multimedia Compression & Communication.

UNIT-1

Multimedia components.

Introduction:-

* The term "multimedia" is used to indicate that the information/ data being transferred over the network may be composed of one or more of the following media types.

Text:-

* This includes both unformatted text, comprising strings of character form a limited character set and formatted text strings as used for the structuring access and presentation of electronic document

Images:-

*these includes computer-generated images, comprising lines, curves, and circles and digitized images. of document and pictures.

Audio:-

* This includes both low-fidelity speech, as used in telephony, and

high-fidelity stereophonic music as used with compact discs.

video :-

* This includes short sequences of moving images (also known as video clips) and complete movies / films)

* The applications may involve either person-to person communications or person to system communications.

* In general two people communicate with each other through suitable terminal equipment (TE) while a person interact with a system using either a multimedia personal computer (PC) or workstation.

* The server may contain in a library of digitized movie/video and ~~the~~ user interacts with the server means by a suitable selection device that is connected to the set-top-box (STB) associated with television.

* for example public switched telephone networks (PSTNs) - also known as general switched telephone networks (GSTNs), were designed initially to provide a basic switched telephone service but as a result of advances in digital signal processing hardware and associated software.

Multimedia skills.

* There are five basic types of communication network that are used to provide multimedic communication services.

  * Telephone network
  * data network
  * Broadcast television networks
  * Integrated servicesdigital network.
  * Broadband multiservice network.

Telephone Network).

* public switched telephone N/w have been in existence for many years and have gone through many changes during this time.

* They were designed to provide a basic switched telephone service which with the advent of the other network types has become a known as a plain old telephone service or POTs.

* As we can see, telephones located in the home or in a small business are connected directly to their nearest local exchange / end offices.

* These located in a medium or large office / site are connected to a private switching office known as a private branch exchange or PBX's.

Data network

* Data network were designed to private basic data communication services such as electronic mail and general file transfer.

* The two most widely deployed networks of this types are the X.25 network and the Internet.

* The Internet is made up of a vast collection of interconnected networks all of which operate using the same set of communication protocols

* As we can see in the case of a user at home or in a small business access to the network the internet is through an intermediate Internet service provider. (ISP) network.

Broadcast television network :-

* BTN were designed to support the diffusion of analog television programs throughout wide geographical areas.

* In the case of a large town or city, the broadcast medium is normally a cable distribution network. While for larger areas, a satellite network or Sometimes a terrestrial broadcast N/W is used.

For example when a cable modem is integrated into

the STB this provides both a low bitrate Channel and high bit rate Channel from the Subscriber back to the Cable head-end.

Integrated service digital network.

* Integrated service digital networks started to be deployed in the early 1980s and were originally designed to provide PSTN users with the capability of having additional services.

* These allow users either to have two different telephone calls in progress simultaneously or two different calls such as a telephone call & a data call.

* With an ISDN, therefore, the access circuit is known as a digital Subscriber line (DSL)

* The digitization of a telephone quality analog speech signal produces a constant bitrate

binary system - normally referred to as a bitstream - of 64 kbps. Hence the basic DSL of the ISDN - known as the basic rate access or BRA - supports two 64 kbps channels.

Broadband multiservice networks:

* Broadband multiservice networks were designed in the mid 1980s for use as public switched networks to support a wide range of multimedia communication applications.

* As such they were designed to be an enchanced ISDN & hence were called Broadband integrated services digital network or B-ISDN.

* Also, for the same reason an ISDN is sometimes referred to as narrowband ISDN (or) N-ISDN.

Multimedia components & their characteristics

Text :-

Unformatted text :-

* This is also known as plaintext and enables pages to be created which comprise strings of fixed-sized characters from a limited character set.

Formatted text :

* This is also known as Rich text and enables pages & complete documents to be created which comprise of strings of characters of different styles, size, & shape with tables, graphics, & images inserted at appropriate points.

Hyper text :-

* This enables an integrated set of documents (each comprising formatted text) to be created which have defined linkage between them.

Unformatted text :

* The set of characters that are available in the ASCII character set the term "ASCII" being an abbreviation for the American Standard Code for information Interchange.

* This is one of the most widely used character set and the table including the binary code words used to represent each character.

Format control characters :

* BS (Backspace), LF (line feed), CR (carriage return), SP (space), DEL (delete), ESC (escape) & FF (Form feed).

Information separators :

* FS (file separator) & RS (Record separator).

Transmission control characters :

* SOH (start of heading), STX (Start of text), ETX (end of Text), ACK (acknowledge), NAK (-ive Acknowledge) SYN (synchronous idle) & DLE (data link escape).

Formatted Text :-

* An example of formatted text is that produced by most word processing packages.

* It is also used extensively in the publishing sector for the preparation of papers, books, magazines, journals and soon.

* It enables document to be created that consist of characters of different styles and of variable size & shape each of which can be plain, bold or italicized.

Example :-

```
<B><FONT SIZE=4><P>Formatted Text
</B></FONT>
<P>This is an example of formatted te
                    it includes:</P
<FONT SIZE=2>
</FONT><I><P>Italics,</I>
<B>Bold</B><U>under
</U>
<FONT FACE="French Script MT
```

<P> Different Fonts </FONT> & <FONT SIZE = 4> Font Sizes </P>

Formatted text

This is an example of formatted text, it includes Italics, Bold and underlining Different fonts and font sizes.

Hyper text.

* Hypertext is a type of formatted text that enables a related set of documents - normally referred to as Pages to be created, which have defined linkage points - referred to as hyper links between each other.

* Associated with each link in addition to the textual name of the link & the related format - control information for its display is a unique network - wide name known as a uniform resource locator (URL).

Images:-

* within the context of this topic images include computer-generated images more generally referred to as computer graphics or simply graphics. and digitized Images of both documents & pictures.

* Although ultimately all three types of image are displayed in the form of a 2D matrix of individual pictures elements known as pixels or sometimes pels.

* Each type is represented differently with in the computer memory or more generally in a computer file.

* Also each type of image is created differently & hence it is helpful for us to consider each separately.

Graphics:-

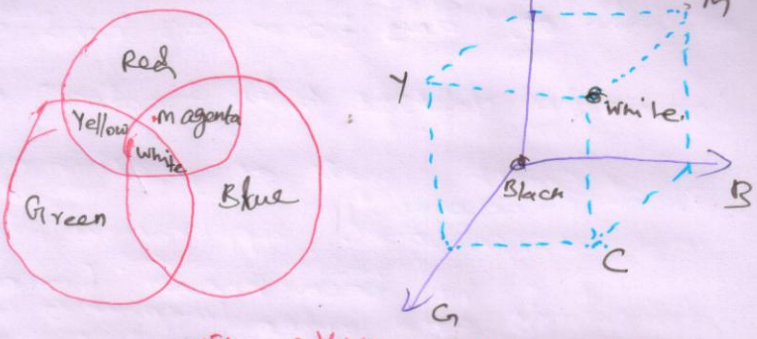


Fig. Additive color mixing

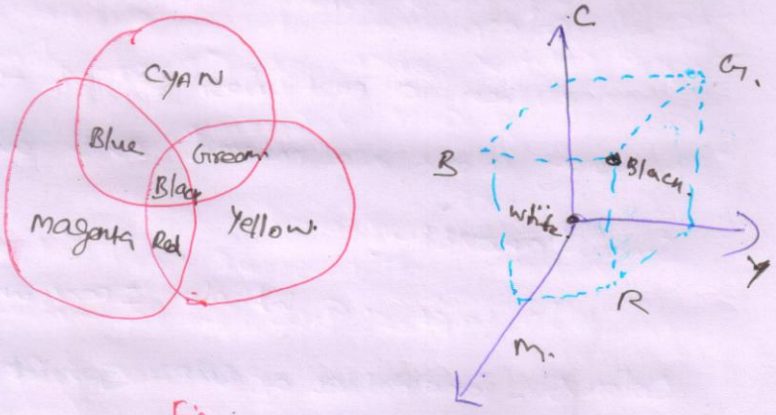


Fig: subtractive color mixing.

* There is a range of Software packages and programs available for the creation of computer graphics.

* These provide easy to use tools to create graphics that are composed of all kinds of visual objects including lines, arcs, squares, rectangles

* This involves a finely-focussed electron beam - the raster - being scanned over the complete screen.

Pixel depth:-

* The number of bits per pixel is known as pixel depth. and determines the range of different colours that can be produced.

Aspect ratio.

* Both the number of pixels per scanned line and the number of lines per frame vary, the actual numbers used being determined by what is known as the Aspect ratio. of the display screen.

* The memory requirements to store a single digital image can be high and vary between 307.2 kbytes for an image displayed on a VGA (video graphics array) screen with 8 bits per pixels, through to approximately 2.36 Mbytes for a SVGA (super VGA) screen with 24 bits per pixel.

Audio :-

* Essentialy, we are concerned with two types of Audio Sgl.

* Speech signals as used in a variety of interpersonal applications including telephony and video telephony and music-quality audio as used in applications such as CD-on-demand and broad cast television.

PCM speech.

* Most interpersonal applications involving speech use for communication purposes a public switched telephone network (PSTN)

* Because this has been in existence for many years the operating parameters associated with it were defined some time ago.

* More modern systems have moved to using 8 bits per sample in each case, giving a much improved performance over early 7 bits systems.

* The digitization procedure is known as pulse code modulation. (PCM) and the international standard relating to this defined in ITU-T Recommendation G.711.

* It consist two additional circuit Compressor (encoder) and an expander. (decoder).

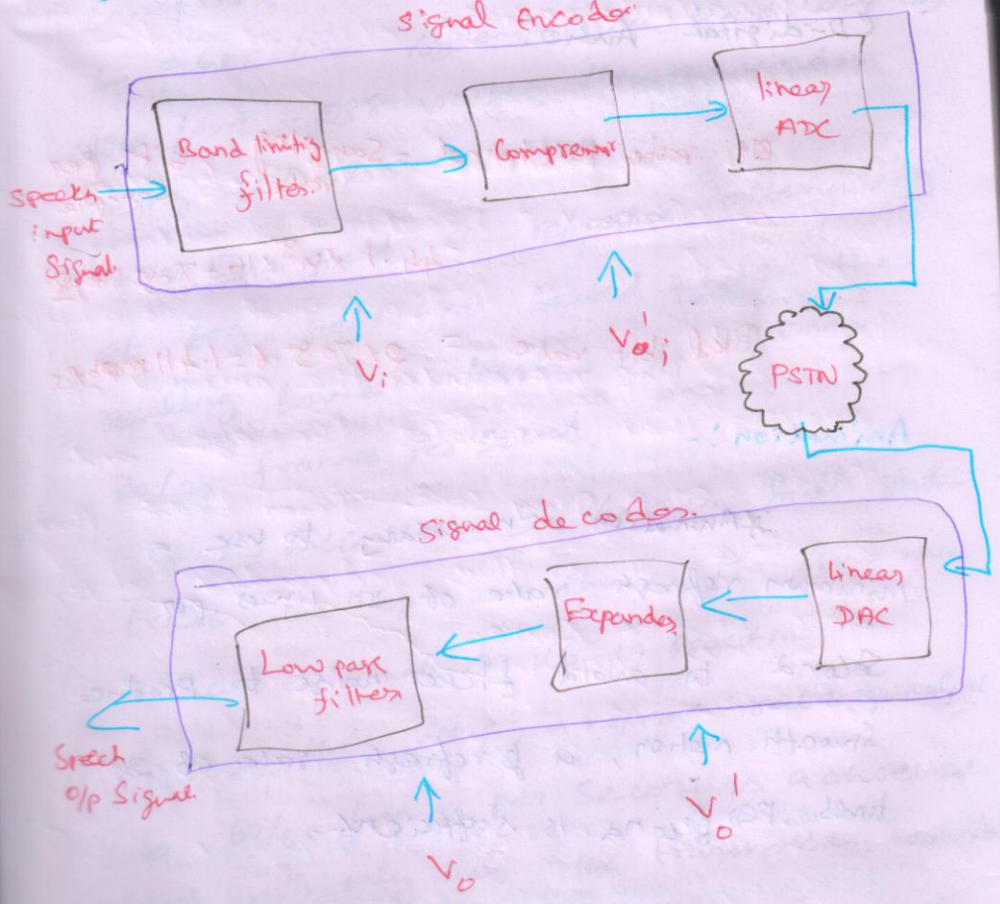


Fig. Signal encoding & decoding schematic.

video :-

* Video features in a range of multimedia applications.

Entertainment :-

* Broad cast television & VCR/DVD recordings.

Interpersonal :-

* Video telephony and video conferencing.

Interactive :-

* Windows containing short video clips.

Brightness :-

* This represents the amount of energy that stimulates the eye and varies on a gray scale from black to white. It is thus independent of the color of the source.

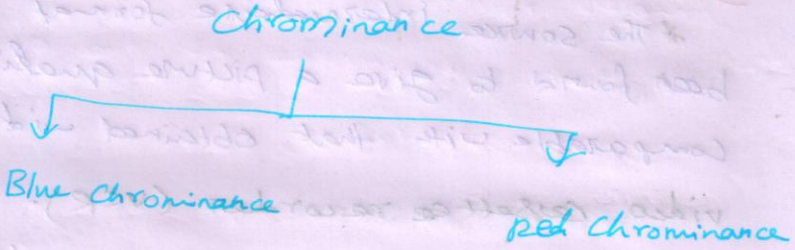
hue :-

* It represents the actual color of the source, each color has a different frequency/wavelength & then eye detects the color.

Saturation:-

* This represents the strength or vividness of the color, a pastel color has a lower level of saturation than a color such as red.

* Also a saturated color such as red has no white light in it.



* The Blue Chrominance and Red Chrominance are then used to represent the coloration - hue & saturation - of the source.

* The Two color difference signals $C_b = B_s - Y_s$ and $C_r = R_s - Y_s$.

HDTV formats

* There are a number of alternative digitization formats associated with high definition television (HDTV).

* The resolution of those which relate to the older 4/3 aspect ratio tubes can up to 1440 x 1152 pixels and the resolution of those which relate to the newer 16/9 wide screen tube can be up to 1920 x pixels.

SIF

* The source intermediate format has been found to give a picture quality comparable with that obtained with video cassette recorder (VCR).

* It uses half the spatial resolution in both horizontal & vertical direction that used in the 4:2:0 format - as technique known as subsampling.

525-line system: $Y = 360 \times 240$

$C_b = C_r = 180 \times 120$

625-line system: $Y = 360 \times 288$

$C_b = C_r = 180 \times 144$.

* The worst case bit rate in both systems this format is

$6.75 \times 10^6 \times 8 + 2(1.6875 \times 10^6 \times 8) = 81 \text{ Mbps}$