MULTIMEDIA TECHNOLOGY - I (23B61CA113)

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Multimedia

Multi + Media

Media:

Images Source: Internet

- **Multi means multiple.**
- **Media is the plural form of the word "medium".**
- **The word *media* literally means "ways of transmission" .**
- **Media is defined as the means/modes of communication that is used to convey/share the information, ideas and messages from one place/person to another.**

Identify the media:

Newspaper

Article

Radio

Books

Images Source: Internet

Traditional Media

- **Even today you will find villages where there is no proper electricity.**
- **People in such places might not be able to view television or access the internet. Similarly, illiterate people will not be able to read newspapers or magazines. However, this does not mean they that do not communicate.**
- **They have also developed different ways of communication depending upon the local language and culture.**

The non electronic mediums which works as part of our culture and as vehicles of transmitting tradition from one generation to another generation is called traditional media.

Image Source: Content Book-Mass Communication,National Institute of Open Schooling

Traditional Media contd...

Image Source:https://in.pinterest.com/pin/594475219584219339/

One may have heard stories from your grandparents about the Ramayana, the Mahabharata, and the kings and queens who ruled the country long ago. Likewise, there are tales about festivals, rituals, and how to become good human beings. This information has been passed down through generations, forming various types of traditional media.

Traditional Media contd...

Image Source:
https://www.fizdi.com/dhol-nagada-art_7060_42104-handpainted-art-painting-13in-x-19in/

In villages, announcement made by beating a 'Nagada' or drum with a stick and used for communicating messages from one village to another through its beats.

Traditional Media contd...

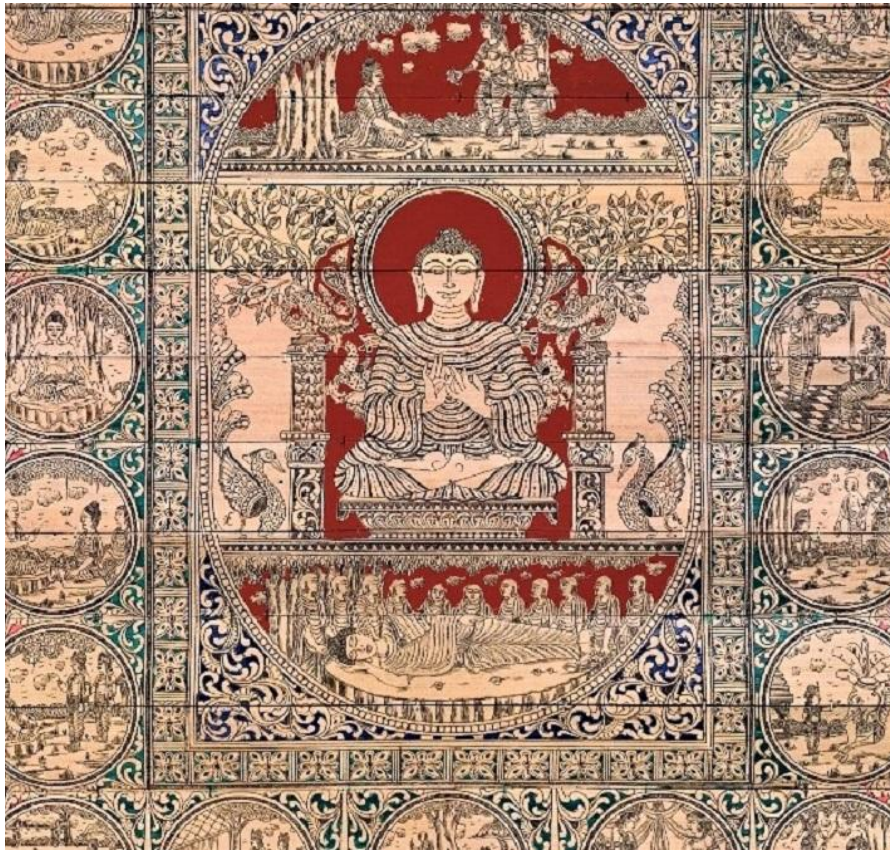


Image Source:
https://www.arteastic.in/blog/palm-leaf-painting-from-odisha/

Patachitra katha refers to stories that have been told through the medium of palm leaf paintings.

Traditional Media contd...

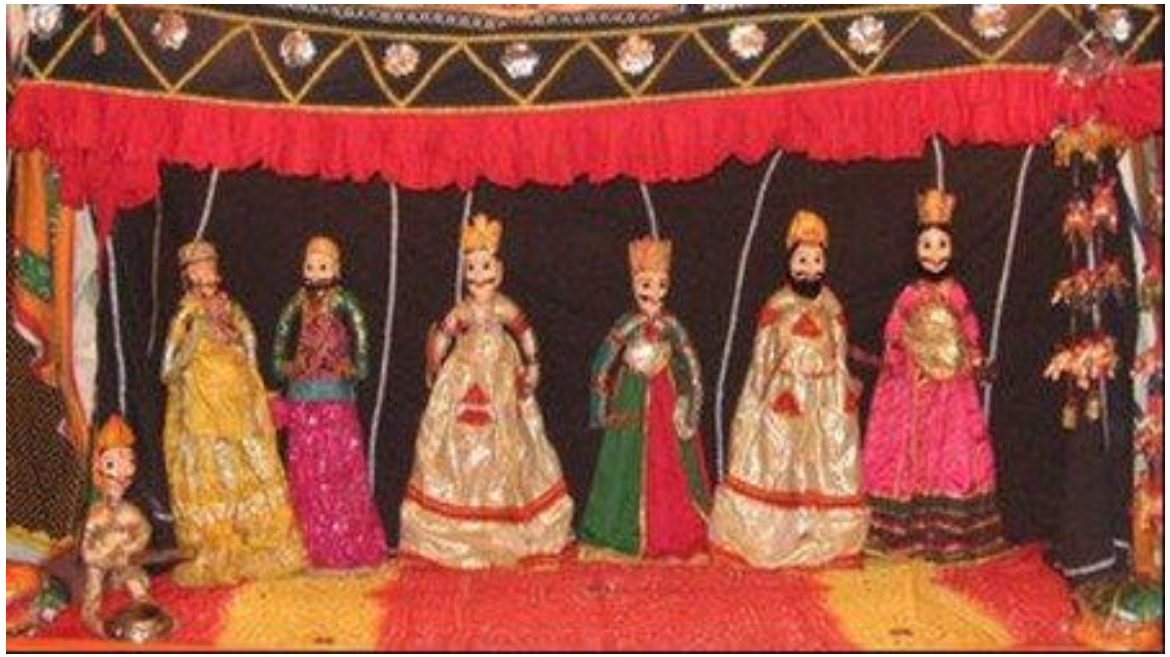


Image Source: https://www.culturopedia.com/puppetry-in-india/

The art of puppetry includes the making and manipulation of puppets for use in some kind of theatrical performance, for stage, television, or film. A puppet is a figure—human, animal, or abstract in form—that is moved by human effort, not mechanical aid. [1]

What is Multimedia?

Image reference: https://www.deviantart.com/yordyfdez/art/Multimedia-Logo-561479869

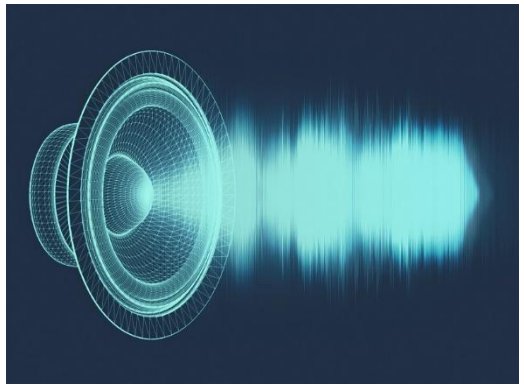
- The term '**multimedia**' implies means of communication through multiple media'.
- Multimedia is any combination of text, art, sound, animation, and video delivered to you by computer or other electronic or digitally manipulated means.
- It provides the information in an interactive and effective way with the combinations of media.
- The kinds of media components and how they are used in a multimedia program matter a lot.

- **For example:** In an effective video, audio and video should be used together as one without another would lose its significance.

Elements of Multimedia

Text

Image



Audio

Animation

Video

Images Source: Internet

Elements of Multimedia contd..

In addition to text, pictures are also started being used to communicate ideas as a picture is worth than thousand words.

Pictures were subdivided into two types:

- **A real-world picture captured by a camera is called images.**
- **A hand-drawn picture like sketches, diagrams and portraits called graphics.**

Images

Graphics

Images Source: Internet

Elements of Multimedia contd..

Text, images and graphics are together referred to as static elements, because they do not change overtime.

With further improve in technology, time varying elements like sound and video were introduced.

Video

- **Video is a technology and medium for the recording, copying, playback, broadcasting, and display of moving visual media.**
- **It involves capturing a series of frames—static images—that, when played in succession at a certain speed, create the illusion of continuous motion.**

Image Source: Internet

Elements of Multimedia contd..

00:00 sec

00:01 sec

Video: A series of frames—still images

Image Reference: https://imerit.net/blog/using-neural-networks-for-video-classification-blog-all-pbm/

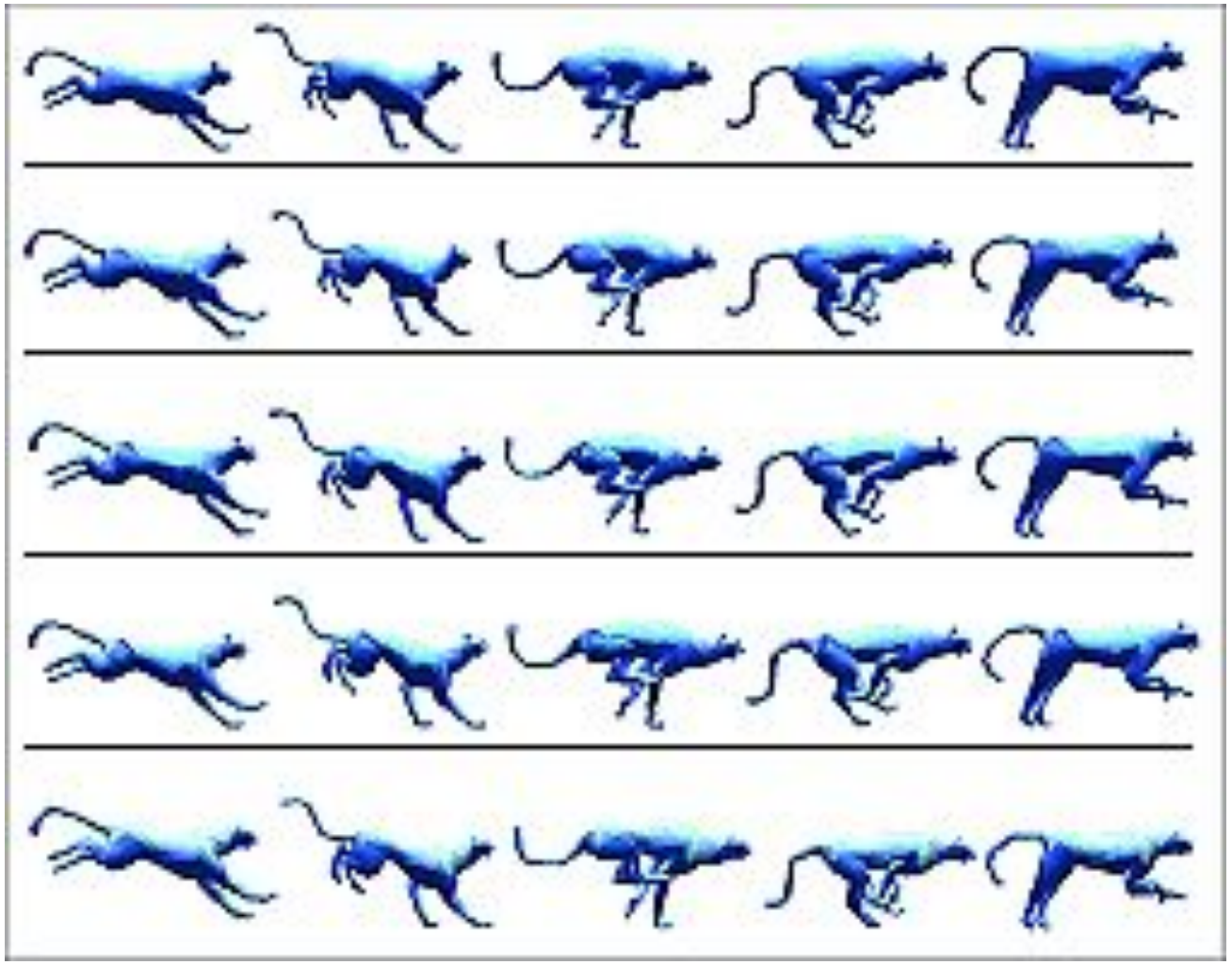
Elements of Multimedia contd..

Animation

- **Animation is a method by which still images are manipulated to appear as moving images.**
- **In traditional animation, images are drawn or painted by hand on transparent celluloid sheets to be photographed and exhibited on film.**
- **Modern animations are made with computer-generated imagery (CGI).**

Image Source: Internet

Elements of Multimedia contd..



A running leopard animation with 15 frames.

Image Reference: https://www.researchgate.net/figure/A-running-leopard-animation-with-15-frames-Top-row-original-mesh-with-4876-faces_fig4_330139533

History of Multimedia

Non-textual form of Communication

Gestures

Cave Paintings

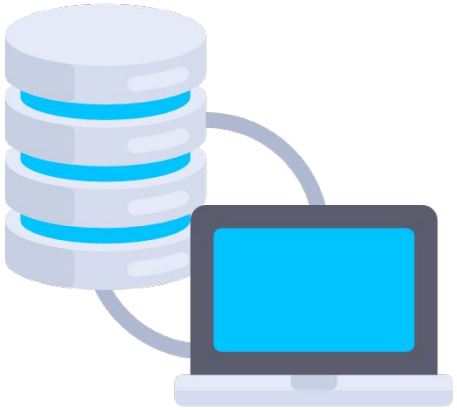
Paintings

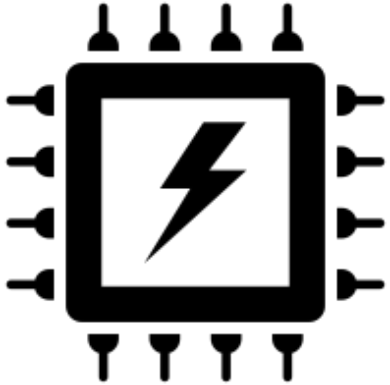
Early Computing Era

- Text was the predominant form of communication over the most of the part of computing history.
- Dealing with text through computers was much easier than dealing non textual media like picture or sound.

Images Source: Internet

History of Multimedia: Challenges in Early Computing Era contd.....

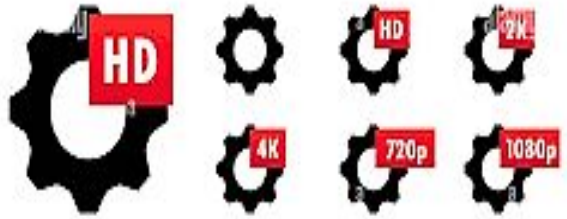




Storage Requirements	Processing Power	• Data Compression
• Non-textual media such as images and sound require much more data per unit than text. • Early computer systems had limited storage capabilities, which made it difficult to store large multimedia files.	• Manipulating and processing multimedia content requires more computational power than text. • Early computers were not powerful enough to efficiently process large images or decode audio at a reasonable speed.	• While text can be efficiently compressed using simple algorithms (like Huffman coding),multimedia compression techniques are more complex. • Techniques for effectively compressing images (e.g., JPEG) and audio (e.g., MP3) were not developed until much later.

Images Source: Internet

History of Multimedia: Challenges in Early Computing Era contd.....



Transmission Speeds	Software and Tools	• Quality and Resolution
• The bandwidth of early networks was very limited. • Text, being less data-intensive, was much easier to transmit over these networks compared to multimedia content, which could easily overwhelm network capacities	• The development of software tools for editing and manipulating multimedia content lagged behind tools for text. • Early text editors were relatively simple, while multimedia editing required more complex and resource-intensive software.	• Early methods of digitizing non-textual media often resulted in low-quality outputs due to the limitations in resolution, color depth, and audio fidelity, which were constrained by the hardware capabilities of the time.

Images Source: Internet

History of Multimedia: Modern Computing Era contd.....

In recent times, many technical barriers have been overcome and practical problems have been solved. Contemporary technologies have addressed the challenges previously faced with non-textual media:

- ✔ Advanced Storage Solutions: SSD, Cloud Storage, etc.
- ✔ Increased Processing Power: Multi-Core CPUs, Graphics Processing Units (GPUs), etc.
- ✔ Advanced Compression Techniques: JPEG, H.265/HEVC, etc.
- ✔ Hardware Acceleration: Allows for faster processing of high-definition video streams without heavily loading the main CPU.
- ✔ Improved Data Throughput: Faster RAM and higher-speed interfaces like Thunderbolt and USB-C, allow quicker data transfer rates.
- ✔ Advance Softwares and Tools.

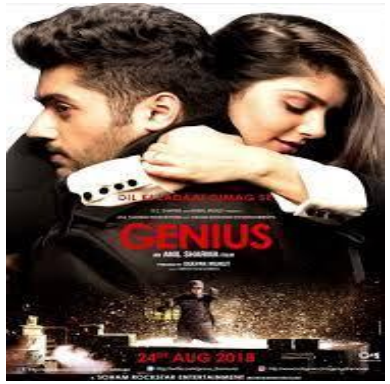
Classification of Multimedia

Linear Multimedia

Non-linear Multimedia

Linear Multimedia

- **It presents the information in sequential or chronological manner.**
- **It has a predetermined starting and ending.**
- **Very less or say no user interaction. Users can only play, pause or stop.**
- **Examples:**



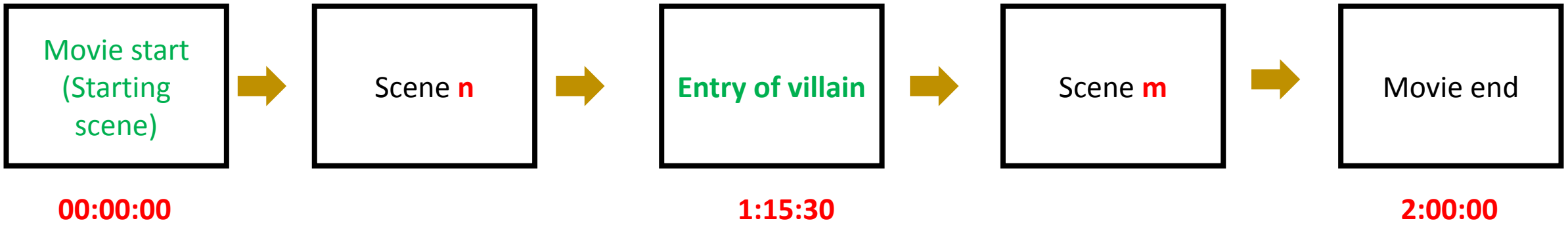
Movies

- Videos

Image Reference: Internet

Illustration of linear multimedia using an example.

Example: Movie



1. In this movie, the scenes will be played in a sequential or chronological order.
2. The movie is automated so that each screen comes after a fixed time-interval.
3. Scene n will always come before entry of villain and scene m.
4. Entry of villain will always take place after scene n and before scene m.
5. Scene m will always happen after scene n and the entry of villain.

Non-linear Multimedia

- It does not present the information in sequential or chronological order instead it provides personalized experience.
- It is user interactive.
- Example: Video Games, Interactive websites, etc.

Video Game

Interactive website

Image Reference: Internet

Illustration of non-linear multimedia using an example.

Example: PUBG-Battlegrounds (Video Game)

- **No predetermined scenes:** Players can freely,
  - ❑ explore the map.
  - ❑ pick up items, weapons, and vehicles.
  - ❑ engage in combat with other players.

- **User-interactive:** Players can decide which weapons to use, when to engage enemies, and whether to play solo or collaborate with teammates.

Image Reference: Internet

Characteristics of Multimedia presentation

- ***Multiple media***
- ***Non-linearity:*** Non-Linearity is the capability of jumping or navigating from within a presentation with one point without appreciable delay.
- ***Interactivity:*** The presentation should be capable of user inputs and capable of change the content of the presentation.
- ***Digital representation:*** Digital representations has other advantages, software based programs can be used to edit the digitized media in various ways to appearances and compress the file sizes to increase the performance efficiency.
- ***Integrity:*** This means that although there may be several media types present and playing simultaneously, they need to be integrated or be part of a single entity which is the presentation. It should not be able to separate out the various media and control them independently; rather they should be controlled from within the frame work of the presentation.

Applications of Multimedia

Education

- **Digital Presentations:** Teachers use multimedia tools to create visually appealing presentations that include text, images, videos, and animations
- **E-Learning Platforms:** Online courses and e-learning platforms often incorporate multimedia elements such as videos, interactive quizzes, simulations, and animations to deliver educational content effectively.
- **Interactive E-Books:** E-books may include multimedia elements such as videos, audio clips, and interactive diagrams to provide a more dynamic and immersive learning experience.
- **Educational Videos:** Video content is used to explain concepts, demonstrate experiments, and provide visual examples.
- **Virtual Labs and Simulations:** Multimedia tools allow students to conduct virtual experiments and simulations, providing a safe and cost-effective way to explore scientific concepts.

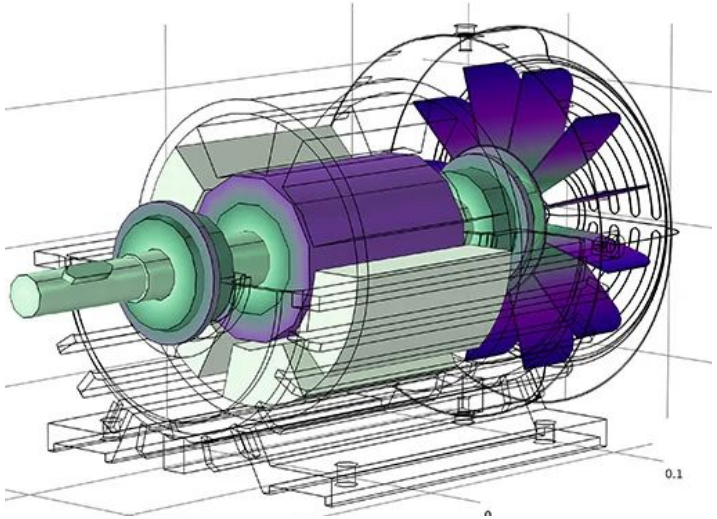


Image Ref.: https://www.pre-scient.com/blogs/cad-software-development/cad-software-for-simulation-and-analysis-integrating-engineering-tools/

Simulation

Image Ref.: https://blogs.ethz.ch/letblog/tag/virtual-labs/

Virtual lab

Business

1. Marketing and Advertising: Multimedia is used for advertising and selling products on the internet, promotes products and services, capturing audience attention with engaging visuals and storytelling and enables interactive advertisements that allow users to engage with the content.

2. Training: Multimedia is one of the best ways to provide short-term training to the workers in a company. E.g. Certain companies utilize multimedia resources like CD-ROMs, DVDs, or online tutorials to train and educate their employees on specific topics. This approach helps businesses save money by eliminating extra costs for staff training and education.

3. Event Promotion and Coverage: Businesses use live streaming for product launches, conferences, and events, reaching a global audience.

4. Data Visualization and Reporting: Infographics simplify complex information, making it easier for stakeholders to understand key insights and trends.

5. Recruitment and Onboarding: Companies create videos to showcase their culture and values, attracting potential employees. Multimedia-based onboarding programs help new employees understand company policies, culture, and expectations.

Image Ref.:
https://illuminationconsulting.com/marketing-and
-advertising-for-retail-websites/

Image Ref.:
https://www.cincopa.com/blog/how-to-live-s
tream-complete-guide-and-best-practices/

Research and Medicine

- In Medicine, doctors acquire training by watching a **virtual surgery.**
- Multimedia materials like videos, animations, and infographics are used to explain medical conditions, treatment options, and surgical procedures to patients.
- Digital imaging technologies like X-rays, MRI scans, and CT scans produce visual representations of internal structures.
- Interactive data visualizations, diagrams, and graphs help convey complex research results effectively.
- It is mostly used for modelling and simulation.
  - Simulation, in simple words, is a way of imitating or recreating real-life situations or processes using models or virtual environments. It helps us learn, practice, and make decisions without actually having to do things for real.

Virtual surgery

Image Ref.
https://www.linkedin.com/pulse/virtual-surgery-transforming-healthcare-harsha-rao

Entertainment

- **Movies and TV Shows:** Multimedia is used to create special effects in films, TV serials, radio shows, games and animations.
- **Video Games:** combining various forms of media to create immersive and engaging virtual worlds.
- **Virtual Reality (VR) :**Virtual Reality is a technology that creates a completely immersive digital environment in which users can interact and engage. When using VR, users typically wear a VR headset that covers their eyes and ears, blocking out the physical world and replacing it with a simulated, computer-generated reality.
- **Social Media:** Platforms like Instagram, Tik-Tok, and Snapchat enable users to share multimedia content like photos, videos, and stories, providing an entertaining way to connect with others.

Virtual Reality

Image Reference: https://www.perforce.com/blog/vcs/virtual-reality-game-development

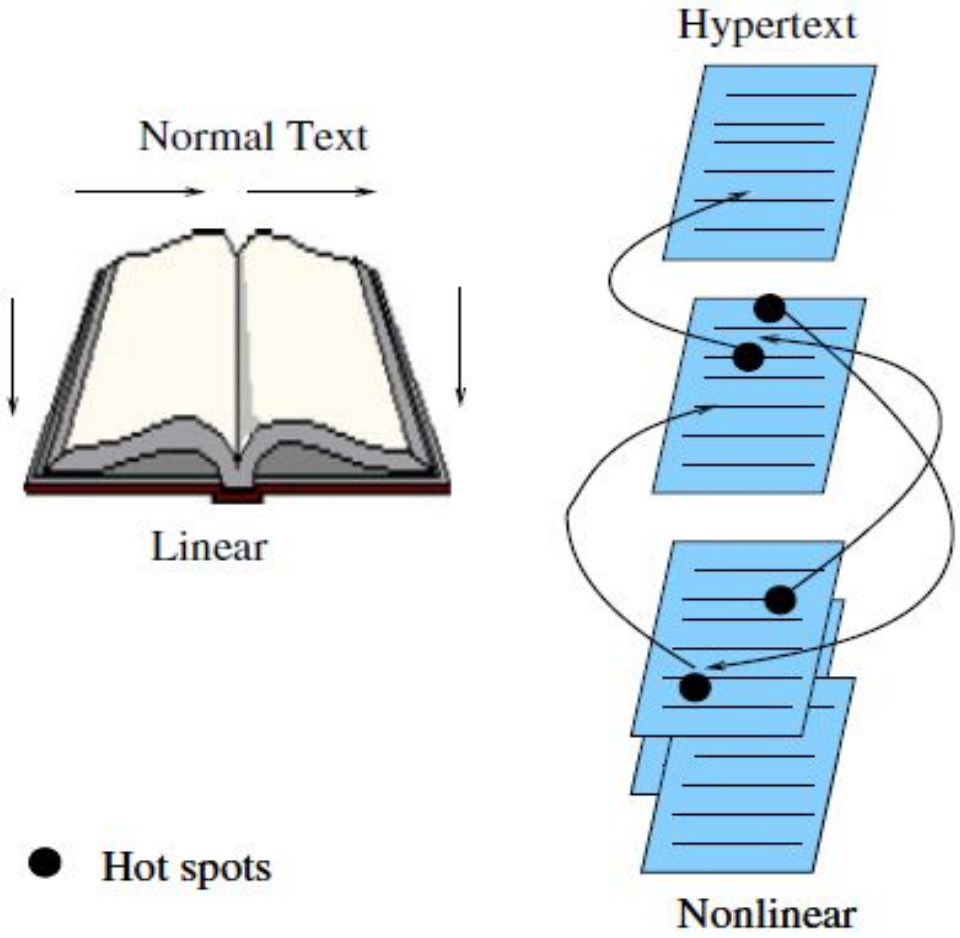
Smart Information Kiosk

- These are devices where information is accessed through a touch screen and viewed on a monitor.
- Examples can be include multi-lingual product, catalog‘s for placing orders or for dispensing important information Bio‘s can also be used to capture statistical data for an in-depth marketing research to be carried out on customer trends.

Image Ref.:
https://in.pinterest.com/pin/information-kiosk-is-a-device-available-for-public-access-in-order-to-provide-certain-information-to-them-on-a-parti--463800461606269755/

Image Ref. :https://www.youtube.com/watch?v=e_-r8xMngWM

Hypertext



- *Hypertext* is a text which contains links to other texts.
- Hypertext is text displayed on a digital device with embedded ***hyperlinks***, enabling users to navigate quickly to related content within or outside the document. Therefore, it is ***non-linear*** in nature.
- Coined by Ted Nelson in 1956, it revolutionized information access by allowing non-linear navigation, akin to book indexes, enhancing web browsing efficiency. [2]

Image Ref.: Z.-N. Li, M. S. Drew, and J. Liu, *Fundamentals of Multimedia.* Springer-Verlag New York Inc, 2016.

Hypertext contd....

Color depth

Article Talk

From Wikipedia, the free encyclopedia

Contents hide

- (Top)
- Comparison
- Indexed color
- List of common depths
  - 1-bit color
  - 2-bit color
  - 3-bit color
  - 4-bit color
  - 5-bit color
  - 6-bit color
  - 8-bit color
  - 12-bit color
  - High color (15/16-bit)

Color depth or **colour depth** (see spelling differences), also known as **bit depth**, is either the number of bits used to indicate the color of a single pixel, or the number of bits used for each color component of a single pixel. When referring to a pixel, the concept can be defined as **bits per pixel** (bpp). When referring to a color component, the concept can be defined as **bits per component**, **bits per channel**, **bits per color** (all three abbreviated bpc), and also **bits per pixel component**, **bits per color channel** or **bits per sample** (bps).[1][2][3] Modern standards tend to use bits per component,[1][2][4][5] but historical lower-depth systems used bits per pixel more often.

Color depth is only one aspect of color representation, expressing the precision with which the amount of each primary can be expressed; the

Bit

Article Talk Read Ed

From Wikipedia, the free encyclopedia

This article is about the unit of information. For other uses, see Bit (disambiguat
"Qbit (quettabit)" redirects here. For quantum bits, see Qubit.

The **bit** is the most basic unit of information in computing and digital communication. The name is a portmanteau of **binary digit**.[1] The bit represents a logical state with one of two possible values. These values are most commonly represented as either "1" or "0", but other representations such as *true*/*false*, *yes*/*no*, *on*/*off*, or +/− are also widely used.

Pixel

Article Talk

From Wikipedia, the free encyclopedia

This article is about the picture element. For the other uses, see Pixel (disambiguation).

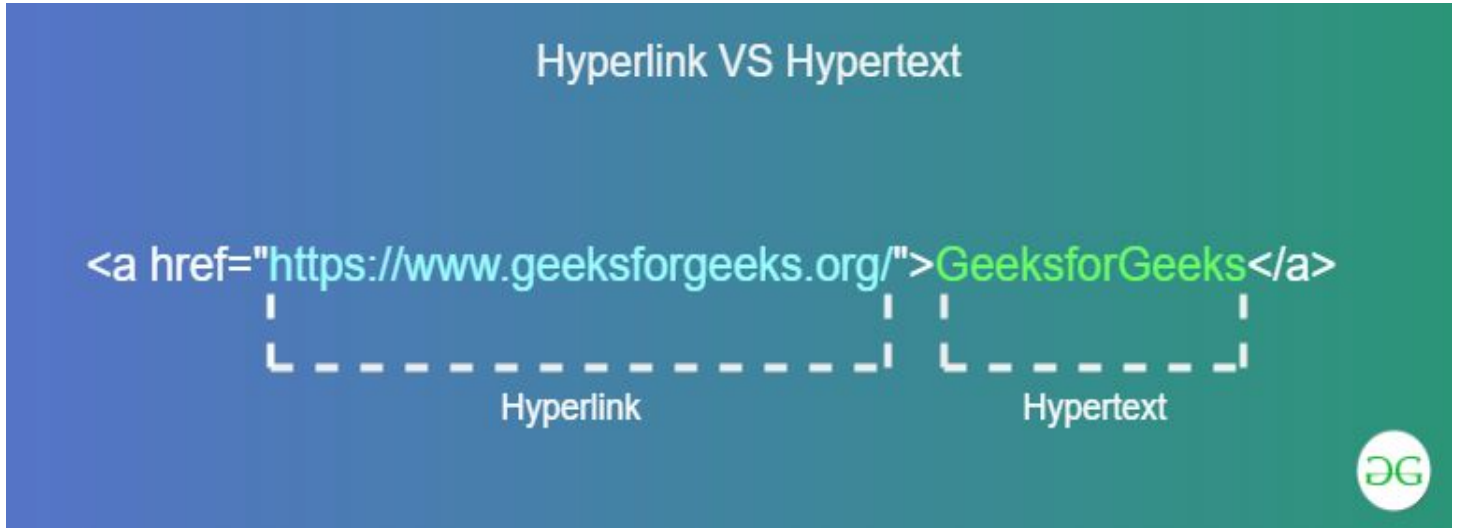
In digital imaging, a **pixel** (abbreviated **px**), **pel**,[1] or **picture element**[2] is the smallest addressable element in a raster image, or the smallest addressable element in a dot matrix display device. In most digital display devices, pixels are the smallest element that can be manipulated through software.

Images Ref.: https://en.wikipedia.org/wiki/Color_depth

Hypertext contd....

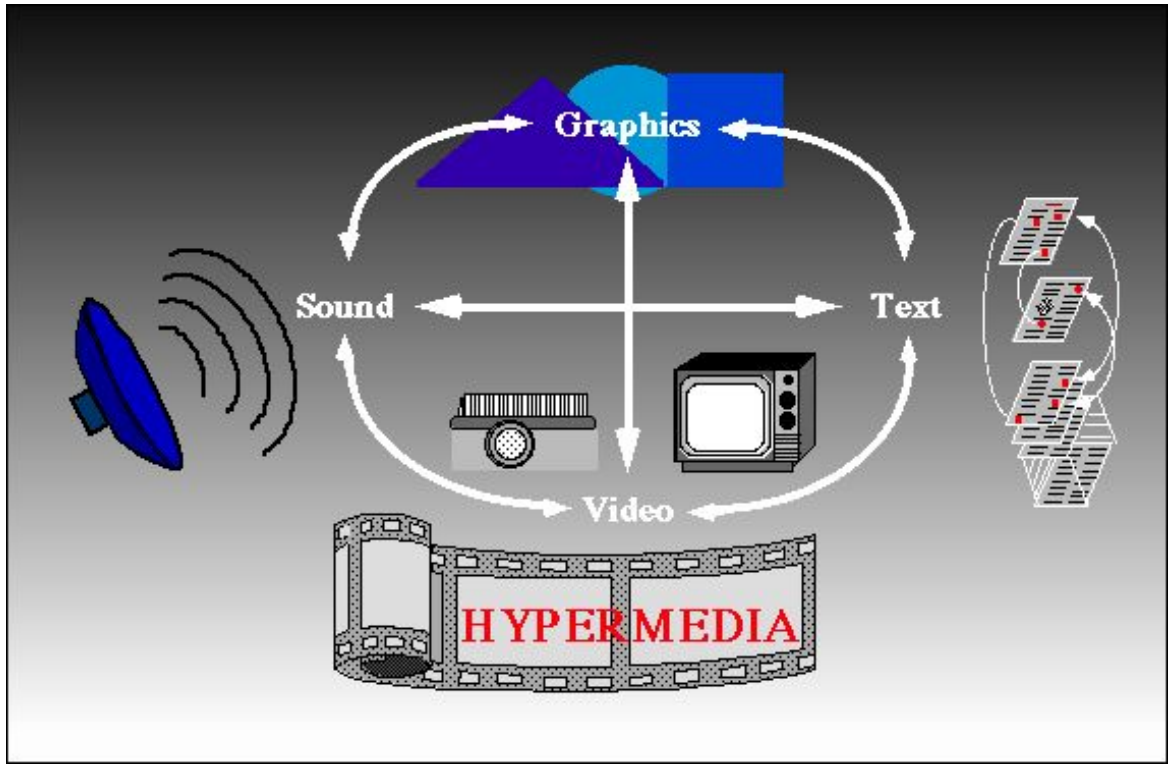
Hyperlink

- A hyperlink is basically a reference that contains a webpage's URL and is activated by clicking on hypertext.
- Hyperlinks are the actual links embedded in hypertext, directing users to different sections, pages, or resources. [2]



Images Ref.: https://www.geeksforgeeks.org/hyperlink-vs-hypertext/

Hypermedia



- ***Hypermedia***, again first introduced by Ted Nelson, went beyond text-only.
- It includes a wide array of media, such as graphics, images, and especially the continuous media—sound and video, and links them together.
- The ***World Wide Web*** (WWW or simply Web) is the best example of a hypermedia application, which is also the largest. [1]

Image Ref.:
https://users.cs.cf.ac.uk/Dave.Marshall/Multimedia/hypermedia.gif

References

1. **Z.-N. Li, M. S. Drew, and J. Liu, *Fundamentals of Multimedia.* Springer-Verlag New York Inc, 2016.**
2. **https://www.geeksforgeeks.org/hyperlink-vs-hypertext/**