Chapter 1

What is Multimedia (according to)

PC vendor: a PC that has sound capability, a DVD-ROM drive, and multimedia-enabled microprocessors that understand additional multimedia instructions.

Consumer entertainment vendor: interactive smart TV with hundreds of digital channels available, or a cable TV-like service delivered over a high-speed Internet connection.

A Computer Science (CS) student: applications that use multiple modalities, including text, images, drawings (graphics), animation, video, sound including speech, and interactivity.

(definition is evolving)

Digital Multimedia

Digital Multimedia: Field concerned with computer-controlled integration of mediums where every type of information can be represented, transmitted and processed digitally.

- coined in the early 90s, after the success of digital audio recording on CDs
- Next step was to create digital content involving image, text, video, along with the audio
- Multimedia CD-ROMs (late 90s examples) :, Encyclopedia Britannica, games with simple graphics,
- only limited to a single user

Example MM Applications

Multimedia involves multiple modalities of text, audio, images, drawings, animation, and video. Examples of how these modalities are put to use:

Example	**Use**
Video teleconferencing.	
Distributed lectures for higher education.	
Tele-medicine.	

Example	Use
Co-operative work environments.	
Searching in large databases for target visual objects.	
“Augmented” reality	placing real-appearing computer graphics and video objects into scenes.
Including audio cues for where video-conference participants are located. Taking into account gaze direction and attention of participants as well	
Building searchable features into new video, and enabling very high to very low-bit-rate use of new, scalable multimedia products.	
Making multimedia components editable	allow the user side to decide what components, video, graphics, etc., are actually viewed; and to move components around or delete them. Making components distributed.
“inverse-Hollywood” applications: apps that recreate the process by which a video was made.	Allows storyboard pruning and concise video summarization.
Using voice-recognition to build an interactive environment, say a kitchen-wall web browser	

Multimedia life cycle

1. Generation, Authoring, Capturing…
2. Representation, and processing
3. Retrieval: answering user queries.
4. Delivery

Inherent Quality of Multimedia Data

1. Digital: it is always bits and bytes

2. Voluminous: the storage and transmission bandwidth limitations require that the data be compressed
3. Interactive
4. Real-time and synchronization: very small and bounded delay while transmitting information. Intramedia and inter-media synchronization

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Multimedia and Computer Science

Multimedia is in the intersection among different areas

1. Graphics
2. HCI
3. Visualization
4. Computer vision
5. Data compression
6. Algorithms
7. Networking
8. Database systems
9. Data mining
10. Architecture and operating systems

Multimedia Research Topics and Projects

To the computer science researcher, multimedia consists of a wide variety of topics:

1. Processing and coding: multimedia content analysis and retrieval, multimedia security, audio/image/video processing, compression, etc.
2. Multimedia system support and networking: network protocols, Internet, operating systems, servers and clients, quality of service (QoS), and databases.
3. Multimedia tools, end-systems and applications: hypermedia systems, user interfaces, authoring systems. Multi-modal interaction and integration: “ubiquity” web-everywhere devices, multimedia education including Computer Supported Collaborative Learning and design, and applications of virtual environments.

Multimedia Systems

Multimedia System: a system capable of processing multimedia data and applications.

Characterized by the

1. processing
2. storage
3. generation
4. manipulation
5. rendition

of Multimedia information.

Components of a Multimedia System

1. Capture devices
   e.g. Camera, Microphone, etc.
2. Storage Devices
   e.g. Hard disks, DVD, etc.
3. Communication Networks
   e.g. Internet
4. Computer Systems
   e.g. Desktop machines, smart phones, etc.
5. Rendering Devices
   e.g. CD-quality speakers, HDTV, etc.

Multimedia System Desirable Features

1. Very High Processing Power
2. Special Hardware/Software needed (e.g. GPUs)
3. Efficient I/O
4. Large Storage and Memory
5. High Speed Network Support

Multimedia History

1. Before the digital age

Age	Time and era	Type of information	Storage medium	Mode of distribution
Prehistoric	15,000 BC	Sounds to communicate, gestures, painting	Rock surfaces, cave walls	N/A
Ancient	500 BC	Alphabets, drawing	Invention of paper	People delivering messages, horseback
Middle Ages	400-1000 AD	Letters, writing	Books	Beginning of a postal system
Renaissance	1300-1800 AD	News, paintings, magazine	Books, libraries	Printing press, steam engines, automobiles
Modern world	1900 AD	Morse code, radio, photographs, movies	Film, magnetic tapes, phonograph	Telegram service, wireless radio waves
Electronic	1950-1980	Telephone, television, fax, computers	Electronic memory, cassette tapes, LP records	Radio and TV broadcasting, satellite communication
Digital	1980-today	Computers, digital video, surround sound	Hard disks, CD-ROMs, DVDs	Ethernet, wireless networks, optical networks

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Text

examples

4. Paper

- first used by the Han Dynasty of China (202 BC). Raw material such as tree bark was finely chopped, mixed with water, spread onto screens, and dried. (Well guarded secret)
- Introduced in Europe in 600AD through the Middle East
- First paper mill in Europe: Spain(1120). More in Italy in about the 13th century. They used hemp and linen rags as a source of fiber. Paper is recorded as being manufactured in both Italy and Germany by 1400.

5. Printing Press

- In 1451, Johannes Gutenberg and Johannes Fust produced a forty-two line Bible and a thirty-two line Latin Grammar
- By 1465, printing presses could be found in Italy, by 1470 in Paris. London in 1480. By 1499, in Stockholm, Constantinople and Lisbon.
- By 1500, Europe had over nine million volumes, thirty thousand titles came off the presses of more than one thousand printers.

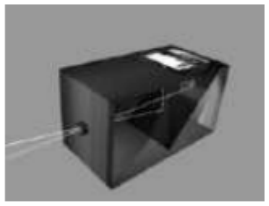
Text

- Input: keyboard, touch pad
- Stored and input character by character.
- Storage of text is 1 or 2 bytes per character.
- Other forms of data (e.g. Spreadsheet files, XML) may store format as text (with formatting).
- Format:
    1. Raw text or formatted text e.g HTML, Rich Text Format (RTF), Word Processing, or a programming language source
    2. Sequential: may have natural implied sequence e.g. HTML format sequence, Sequence of Java program statements.
- Size Not significant compared with other multimedia data

Images

examples

1. Painting on some media: From Prehistoric times till today (Examples):



Camera obscura
Mozi 400BC
Aristotle 350BC
Ibn al-Haitham, 1000AD

Niepce 1825
(8 hours)

Daguerre 1838
(10 mn)

Maxwell 1861
(color)

2. cameras (examples)
    1. Eastman's Kodak camera (1888)
    2. Digital (now)

Images

- Still pictures which (uncompressed) are represented as a bitmap (a grid of pixels).
- Input: Digital camera, scanner or generated by graphics editing programs
- Analog sources will require digitizing.
- Stored at 1 bit per pixel (Black and White), 8 Bits per pixel (Grey Scale, Color Map) or 24 Bits per pixel (True Color)
- Size: a 512x512 Grey scale image : 1/4 Mb, a 512x512 24 bit image: 3/4 Mb (no compression.)
- Storage increases with image size § Compression is commonly applied

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Audio

Music Examples

1. Phonograph and gramophone (1877-1887)
2. Edison cylinders (1904)
3. Records
4. Track Tape Deck
5. Digital

Video

- Input: usually captured by a video camera.
- There are a variety of video (analog and digital) formats
- Raw video can be regarded as being a series of single images.
- There are typically 25, 30 or 50 frames per second.
- a 512x512 size monochrome video images take 25 * 0.25 = 6.25Mb for 1 second to store uncompressed.
- Digital video clearly needs to be compressed.

How many images and videos are online?

- In 2009: 2.5 B photos uploaded to Facebook every month
- That’s 30 B photos per year on FB alone
- In 2011: 6 B per month – 90 B total
- Youtube:
  - in 2011, 48 hours of video are uploaded every minute, resulting in nearly 8 years of content uploaded every day.
  - In 2014, the number is 100 hours/minute.

Multimedia in a Ubiquitous Computing World

- Multimedia is becoming available all the time around us.
- Ubiquitous computing focus on integrating computation into the environment, rather than having computers as distinct objects.
- Ubiquitous computing covers wide range of research topics, such as
  1. distributed computing
  2. mobile computing
  3. sensor networks.
- Mobile phones: most commonly devices.

Chapter 2

Tasks and Concerns

Multimedia content is found in all software.

We are can make interactive applications (or “presentations”), using:

1. video editors such as Adobe Premiere or Cyberlink PowerDirector
2. still-image editors such as Adobe Photoshop in the first instance.

we can link them into interactive programs using authoring tools that can include sophisticated programming such as

1. Flash
2. Director

Presentation

Graphics Styles

Careful thought has gone into

1. combinations of color schemes
2. how lettering is perceived in a presentation.

things that should be considered when constructing (in order)

1. Presentation
2. The Human visual dynamics

Human visual dynamics :As soon as the eye moves, it re-adjusts its exposure both chemically and geometrically (how)
by adjusting the iris ,which regulates the size of the pupil.

Color Principles and Guidelines

Some color schemes and art styles are best combined with a certain theme or style.

A general hint is to not use too many colors (explain why)

- as this can be distracting.

It helps to be consistent with the use of color

Colors can be used to signal changes in theme.

Font

For effective visual communication,:

1. large fonts (18 to 36 points) are best,
2. between six to eight lines per screen

A Color Contrast

What is he simplest approach to making readable colors on a screen

- using the principal complementary color as the background for text.

For R, G, B color values in the range 0–1(0–255), a legible color for the background is likely given by that color subtracted from the maximum:

(R, G, B) ⇒ (1 − R, 1 − G, 1 − B) or (R, G, B) ⇒ (255 − R, 255 − G, 255 − B)

Another way to make reasonable color on a screen is the color “opposite”
if the text is bright, the background is dark, and vice versa.

Sprite Animation +Video Transitions

Sprites are often used in animation.

Video transitions are syntactic (to signal “scene changes”), and often carry semantic meaning.

Types of transitions

A) Cut: Abrupt change of contents in two consecutive video frames from their respective clips.

It is the:

- simplest
- most frequently used video transition.

B) Wipe : Replacement of the pixels in a region of the viewport with those from another video.

C) Dissolve: replaces every pixel with a mixture over time of the two videos, gradually changing the first to the second.

E+F) Fade-in +Fade-out.

Eye dynamic range

- The retina has a static contrast ratio of around 100:1 (about 6.5 f-stops)
- The contrast ratio: property of a display system, the ratio of the luminance of the brightest color (white) to that of the darkest color (black) that the system is capable of producing (100:1)
- F-number, F-stop, focal stop, or The aperture stop: The aperture setting that limits the brightness of the image by restricting the input pupil size.

F-Stop:

The eye includes a lens similar to lenses found in optical instruments such as cameras.

The pupil of the human eye is its aperture, the iris is the diaphragm that serves as the aperture stop.

The f-number N is given by: N=f/D, where f is the focal length , and D is the diameter of the entrance pupil

For example, if a lens's focal length is 10 mm and its entrance pupil diameter is 5 mm, the f-number is 2 and the aperture diameter is f/2.

Data Compression:

One of the most evident and important challenges of using multimedia .

What do we need to avoid such high data rates that cause problems for storage and networks.

- excellent and fast data compression

The more image compression is done, the worse the quality

Multimedia Production:

During the production timeline:

When is the programmer is involved
when the project is about 40% complete

the design phase consists of:

1. Storyboarding,
2. Flowcharting,
3. Prototyping,
4. User testing,
5. Parallel production of media.

Programming and debugging phases would be carried out in consultation with marketing, and the distribution phase would follow.

Sharing and Distribution

Ways to Share Multimedia

1. Optical disks
2. USB
3. Internet

Example: YouTube

A user can easily create a Google account and channel, and then upload a video, which will be shared to everyone or to selected users.

YouTube further enables titles and tags that are used to classify the videos and link similar videos together.

The link to this video can be fed into such other social networking sites such as Facebook or Twitter.

In the UK, the BBC’s iPlayer broadcasts TV programs to TV subscribers and public Internet users with Adobe Flashplayer since 2007.

In the US, CNBC, Bloomberg Television, and Showtime use live-streaming services.

China, the largest Internet Protocol TV (IPTV) market by subscribers (12.6 million) to date, is probably the most vigorous market.

IPTV services are becoming

- highly personalized
- integrated
- portable
- on-demand.

Most service providers are moving beyond basic video offerings toward richer user experiences, particularly with the support for

- multi-screen viewing across TVs,
- PCs,
- tablets
- smartphones.

Some Useful Editing and Authoring Tools

Video editing tool examples:

Premiere: video editing program that allows you to quickly create a simple digital video by assembling and merging multimedia components

Director: complete environment for creating interactive “movies” and animation.

Traditional animation is created by showing slightly different images over time.

Flash: is a simple authoring tool that facilitates the creation of interactive movies.

Chapter 3.1

Creation of multimedia images

Images may be

1. photograph-like bitmaps
2. vector-based drawings

3. 3D renderings

- The type of still images created depends on

1. the display resolution
2. hardware and software capabilities.

- Access to the right tools and right hardware for image development is important!
    - E.g., graphic design like to have large, high-resolution monitors or multiple monitors

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Types of Still Images

1. bitmaps (or raster-based) .
2. Vector-drawn graphics.

Bitmaps

derived from the words ‘bit’, which means the simplest element in which only two digits are used,

and ‘map’, which is a two-dimensional matrix of these bits.

Bitmap: Data matrix describing the individual dots of an image that are the smallest elements of resolution on a computer screen or printer.

Suited for creation of:

1. Photo-realistic images.
2. Complex drawings.
3. Images that require fine detail.

- Bitmapped images are known as paint graphics.
- Bitmapped images can have varying bit and color depths.

More bits provide more color depth, hence more photo-realism, but require more memory and processing power.

Bit-depth	Numbers of possible colors	Available binary Combinations for Describing a Color
1-bit	2	0,1
2-bits	4	00,01,10,11
4-bits	16	0000,0001,0010,0011 0100,0101,0110,0111 1000,1001,1010,1011 1100,1101,1110,1111

Monochrome requires one bit per pixel, representing black or white

8 bits per pixel allows 256 distinct colors

16 bits per pixel represents 32K distinct colors (Most graphic chipsets now supports the full 65536 colors and the color green uses the extra one bit)

24 bits per pixel allows millions of colors

32 bits per pixel – trillion of colors

best use for bitmaps

1. photo-realistic images
2. complex drawings requiring fine detail

Bitmaps picture and their suitability of use:-

- Use the native Microsoft bmp format as a raw image that will later be processed. (why)
  - It's faster to process.
- Use JPEG, for photo sharing on the web (why)
  - because of its size and quality
- GIF is normally used for diagrams, buttons, etc., that have a small number of colours and simple animations (why)
  - because it supports interlaced images
- PNG is almost equal to gif except that it didn’t support the animation format.

Bitmaps can be inserted by:

1. Using clip art galleries.
2. Using bitmap software.
3. Capturing and editing images.
4. Scanning images.

Chapter 3.2

Using Clip Art Galleries

Clip art gallery: Assortment of graphics, photographs, sound, and video

They are a popular alternative for users who do not want to create their own images.

They are available on

1. CD-ROMs
2. The Internet.

Legal rights :

1. Public domain image
2. Royalty free image
3. Right Managed Image

Using Bitmap Software

Q. What is The industry standard for bitmap painting and editing programs are:

Ans:

1. Adobe's Photoshop and Illustrator.
2. Macromedia's Fireworks.
3. Corel's Painter.
4. CorelDraw.
5. Quark Express.

Capturing and Editing Images

Capturing and storing images directly from the screen is another way to assemble images for multimedia.

how to copy the screen image to the clipboard on:

Windows: The PRINT SCREEN button

Mac: COMMAND-CONTROL-SHIFT-4 keystroke.

Clipboard : a temporary memory to store the COPY, CUT and PASTE data.

Image editing programs enable the user to:

1. Enhance and make composite images.
2. Alter and distort images.
3. Add and delete elements.
4. Morph (manipulate still images to create animated transformations).
5. High Resolution Image : based on dot per inch (dpi) & effect file size

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High vs Low Resolution Photo

Low resolution photo

- Includes most pictures found on the web normally, not suitable for print quality.
- Cannot be made into a high resolution photo

High resolution photo

- Determined by its number of pixels (Direct relationship).
- Print quality

Scanning Images

We can scan images from conventional sources and make necessary changes.

Applications of Vector-Drawn Images

Vector-drawn images: created from geometric objects such as lines, rectangles, ovals, polygons using mathematical formulas

Uses:

1. Computer-aided design (CAD) programs.

2. Graphic artists designing for the print media.
3. 3-D animation programs.
4. Applications requiring drawing of graphic shapes.

How Vector-Drawn Images Work

A vector is a line that is described by the location of its two endpoints.

• Vector drawing makes use of Cartesian co-ordinates.

• Cartesian coordinates: numbers that describe a point in two or three-dimensional space as the intersection of X, Y, and Z axis.

Example: RECT 0,0,200,300,RED,BLUE

Q: Explain the above example:

Ans: Draw a rectangle at 0,0 going 200 pixels horizontally and 300 pixels vertically, with a RED boundary and filled with BLUE

Chapter 3.3

Vector-Drawn Images vs Bitmaps

Vector images have smaller file sizes and memory space (.svg) than bitmaps.

Web pages using vector graphics load and render faster than bitmaps.

Vectors can't be used for photorealistic images.

Vectors require a plug-in for web display.

Bitmaps aren't easily scalable or resizable.

Bitmaps can be converted to vectors via auto tracing.

Vector-Drawn Images vs Bitmaps

3D graphics tools examples:

1. Macromedia Extreme3D
2. Form-Z

Q. how many dimensions do 3D graphics tools typically extend vector drawn graphics?

Ans: 3 dimensions (x, y and z)

A 3D scene consist of object that in turn contain many small elements, such as blocks, cylinders, spheres or cones (described in terms of vector graphics)

The more elements, the finer the object's resolution and smoothness.

Properties of objects:

1. shape
2. color
3. texture
4. shading
5. location.

what can a 3D application do?
it lets you model an object's shape, then render it completely.

Features of a 3-D Application

1. Modeling: drawing a shape, and extruding it or lathing it into a third dimension.

- extruding: extending its shape along a defined path
- lathing: rotating a profile of the shape around a defined axis

Also deals with lighting and setting a camera view to project shadows

2. Rendering: producing a final output of a scene, is more compute-intensive

3-D animation, drawing, and rendering tools:

1. Ray Dream Designer.
2. Caligari True Space 2.
3. Specular Infini-D.
4. Form * Z.

5. NewTek's Lightwave.

Natural Light and Color

Light comes from an atom where an electron passes from a higher to a lower energy level.

Each atom produces uniquely specific colors.

Color: the frequency of a light wave within the narrow band of the electromagnetic spectrum, to which the human eye responds.

Eye can differentiate 80,000 different colors.

Color and Culture

Color	China	Japan	Egypt	France	United States
Red	Happiness	Anger, Danger,	Death	Aristocracy	Danger, Stop
Blue	Heavens, Clouds	Villainy	Virtue, Faith, Truth	Freedom, Peace,	Masculine
Green	Ming Dynasty, Heavens,	Future, Youth, Energy	Fertility, Strength	Criminality	Safety, Go
Yellow	Birth, Wealth, Power	Grace, Nobility	Happiness, Prosperity,	Temporary	Cowardice, Temporary
White	Death,Purity	Death	Joy	Neutrality	Purity

Emotion	Color	Emotion	Color
Happy	**Yellow**	Inexpensive	**Brown**
Pure	**White**	Powerful	**Red**
Good Luck	**Green**	Dependable	**Blue**
Good	**Red**	High Quality	**Black**
Dignity	**Purple**	Nausea	**Green**
High Technology	**Silver**	Deity	**White**
Sexiness	**Red**	Bad Luck	**Black**
Mourning	**Black**	Favorite Color	**Blue**
Expensive	**Gold**	Least Favorite Color	**Orange**

Computererized Color

The tools we use to describe color are different when the color is printed than from when it is projected

Methods of making color

1. Additive Color

A color is created by combining colored light sources in three primary colors red, green, and blue.

Used by Old TV and computer monitors

2. Subtractive Color

Color is created by combining colored media such as paints or ink.

The colored media absorb (or subtract) some parts of the color spectrum of light and reflect the others back to the eye.

Subtractive color is used to create color in printing.

The printed page consists of tiny halftone dots of three primary colors- cyan (complement of Red), magenta (complement of Green), and yellow (Complement of Blue)

Monitor-Specific Colors

Colors should be used according to the target audience's monitor specifications.

The preferred monitor resolution is 1024x768 pixels and higher.

The preferred color depth is 24 bits or more which can display 16,777,216 different colors .

Computer Color Models

Different ways of representing information about color.

Models used to specify color in computer terms

1. RGB Model

Add red, green and blue to create colors, (additive model).

Assigns an intensity value to each pixel ranging from 0 (black) to 255 (white)

example: Bright red (R 246, G 20, B 50)

24 bits

2. HSB and HSL Color Models

Based on human perception of color

Three fundamental properties of color:

1. Hue: color reflected from or transmitted through an object, measured on color wheel (0 -360 degrees)
2. Saturation (chroma): intensity of color (% of grey in proportion to hue))
3. Brightness / Lightness: relative lightness or darkness of color (%)

3. CMYK Model (modsubtractive model)

Based on light-absorbing quality of ink printed on paper

As light is absorbed, part of the spectrum is absorbed and part is reflected back to eyes

Associated with printing.

Four channels: Cyan (C), magenta (M), yellow (Y) and black (K)

In theory, pure colors should produce black, but printing inks contain impurities, so this combination produces muddy brown

Q: why is a CMYK is four-color process printing
Ans: K is needed to produce pure black

Other models include CIE, YIQ, YUV, and YCC.

Color Palettes

Palettes: mathematical tables that define the color of pixels displayed on the screen.

Palettes are called ‘color lookup tables’ or CLUTs on Mac.

The most common palettes are 1, 4, 8, 16, and 24-bit deep.

Dithering

Dithering: The change of each pixel's color value to the closest matching color value in the target palette.

How is it done ?
using a mathematical algorithm.

Image File Types used in Multimedia

Mac Formats

The most commonly used format is PICT.

It's a complicated and versatile format developed by Apple.

Almost all image apps on Mac can import or export them.

Windows Formats

Most common: DIB (Device-independent bitmaps) (aka BMP).

Bitmap formats used most often by Windows developers are:

1. BMP: A Windows bitmap file: Native bitmap file format of the Microsoft Windows environment
2. TIFF: Used only in DTP packages, used to exchange docs between apps and platforms
3. PCX: Used by MS-DOS paint software, One of the oldest bitmapped formats, first appeared in the early 1980's

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Cross-Platform Formats

DXF, IGS or IGES - Used by CAD applications.

CDR – CorelDraw, PSD – Photoshop n AI - Illustrator

JPEG, PNG and GIF - Most commonly used formats on the Web.

Most Popular Image File Formats

JPEG (Joint-Photographic Experts Group)

Use continuous tone images, such as full-color photographs

Supports more than 16 millions of color (24-bit)

Uses lossy compression (averaging may lose information)

GIF (Graphical Interchange Format)

Use: large areas of the same color and a moderate level of detail.

Supports up to 256 colors

Allows transparency and interlacing

Uses lossless compression

PNG (Portable Network Graphic)

lossless, portable, well-compressed storage of raster images

patent-free replacement for GIF

also replace many common uses of TIFF

Support indexed-color, grayscale, and true color images + an optional alpha channel for transparency

Other formats: BMP, PSD, TIFF/TIF, TGA, EPS, PCX, ICO

Information Delivery

Images or Graphics are used to convey info in multimedia products.

For example, a picture of an car is much more effective than text that describes it

Images or Graphics for information delivery include:

1. Drawn images
2. Charts and graphs
3. Maps
4. Scenery
5. People

The image must be relevant to the overall product.

Image size, color in respect to the application and other images, and positioning must all be considered when using images.

Chapter 6: Multimedia Authoring and Tools

Multimedia Authoring

Multimedia Authoring: The creation of multimedia productions, sometimes called "movies“ or "presentations".

From a computer science point of view, we are mostly interested in interactive applications.

Multimedia Authoring Metaphors

Authoring: The process of creating multimedia applications.

Most authoring programs use one of several authoring metaphors (authoring paradigms):

Authoring Metaphors: metaphors for easier understanding of the methodology employed to create multimedia applications

common authoring metaphors are as follows:

1) Scripting language metaphor :

Using a special language to enable interactivity (buttons, mouse, etc.) and allow conditionals, jumps, loops, functions/macros, and so on.

examples:

```
-- Load an MPEG file
extFileName of MediaPlayer "theMpegPath" "C:\windows\media\home33.mpg"

-- Play the file
extPlayCount of MediaPlayer "theMpegPath" "1"

-- Set MediaPlayer to frames mode (instead of time mode)
extDisplayMode of MediaPlayer "theMpegPath" "1"

-- Optional: Specify start and end frames for playback
extSelectionStart of MediaPlayer "theMpegPath" 103
extSelectionEnd of MediaPlayer "theMpegPath" 1997

-- Start playback
get extPlay() of MediaPlayer "theMpegPath"
```

2) Slide show metaphor

Slide shows are by default a linear presentation.

some tools exist to perform jumps in slide shows, few use them.

Example

1. PowerPoint
2. ImageQ.

3) Hierarchical metaphor

user-controllable elements are organized into a tree structure, often used in menu-driven applications.

4) Iconic/flow-control metaphor

The standard is Authorware, by Macromedia.

5) Frames metaphor

"frames" represent more abstraction than in the simpler iconic lflow-control metaphor.

Frames are constructed from objects (text, graphics, audio, animations, and video), all of which can respond to events.

6) Card/scripting metaphor

Uses a simple index-card structure to produce multimedia productions.

This is an easy route to producing applications that use
hypertext or hypermedia. (why)

- Since links are available

The original was HyperCard by Apple. Another example is HyperStudio by Knowledge Adventure.

7) Cast/score/scripting metaphor

Time is shown horizontally in a type of spreadsheet fashion

Rows (tracks) represent instantiations of characters in a multimedia production.

Example:
Director, by Macromedia (uses the Lingo scripting language, an object-oriented, event-driven language).

Multimedia Production

A multimedia project can involve a host of people with specialized skills. (examples)

1. art director
2. graphic designer
3. production artist
4. producer
5. project manager
6. writer

7. user interface designer
8. sound designer
9. videographer
10. 3D and 2D animators
11. as well as programmers.

Chapter 7: Text

Text in History

Text came into use about 6,000 years ago

Using symbols for communication 6,0000 years old

15th Century- Johann Gutenberg printing press revolutionized information.

But today, text and the ability to read are doorways to power and Knowledge.

Reading and writings are expected necessary skills.

Recently another revolution, The World Wide Web and its native language - HTML

The Power of Meaning and the Importance of Text

Words must be chosen carefully, test the words you plan to use and keep a thesaurus handy

Words appear in:

1. Titles
2. Menus
3. Navigational aids

Using Text in Multimedia

Type terminology:

1. Typeface (examples)

1. Arial

2. Courier
3. Times
2. Fonts
3. Points
4. Styles
5. Leading
6. Kerning

Fonts and Faces

Typeface: a family of graphic characters that includes many type sizes and styles (such as Times, Arial, Helvetica)

A font: a collection of characters of a single size and style belonging to a typeface family (such as bold, italic)

Font sizes are in points (1 point = 1/72 inch measured from top to bottom of descenders in capital letter).

X-height is the height of the lower case letter x

Factors affecting legibility of text

1. Size.
2. Background and foreground color.
3. Styles. (Examples)
    1. Italic
    2. Bold
    3. Underlined
    4. Outlined
4. Leading (pronounced “ledding”).

Leading and Kerning

Leading: The space between lines

Kerning: The space between pairs of letters

Fonts and Faces

PostScript, TrueType and Master fonts can be altered.

Bitmapped fonts cannot be altered

The computer draws or rasterized a letter on the screen with pixels or dots.

Cases

The upper drawer held the capital letters, and the lower drawer held the smaller letters

From this we get the terms uppercase and lowercase

to yell in online messaging, use UPPERCASE LETTERS

Case Sensitive

Password, and paths in a URL are case sensitive (that is “home” is different from “HOME”)

Words that have a mix of upper and lower case letters are read easier than all upper case.

Placing an Uppercase letter in the middle of the word ,called an Intercap, a trend that emerged from computer programming community.

Example : middleName,endOfChar

Serif and Sans Serif

Type either has a little decoration at the end of the letter - called a serif

or it doesn’t - sans serif (“sans” from the French meaning without)

Using Text In Multimedia

WYSIWYG
What
You See
Is
What
You
Get

Balance between too much text and too little.

Make web pages no more than 1 to 2 screenfuls of text

Guide the user with as few actions as possible.

Use menu text accompanied by a single action.(why)

- This requires little training and is clean and immediate.

Use text for titles, for menus, for navigations, and for content.

Designing with Text

Your font choice font size and number of headlines you place on a particular screen must be related both to complexity of your message and to its venue.

If the messages are a part of interactive website where the user is seeking information ,lots of information can be packed on to the screen, where too little text on each page could be annoying, as user requires to unnecessary wait and click mouse.

for Public Presentations, contents must be organized into small points, large fonts and lots of white spaces.

Choosing Text Fonts

- Use the most legible font.
- Limit the number of different fonts (avoid “ransom-note” style).
- Utilize bold and italics for emphasis.
- Adjust line spacing (leading) and letter spacing in headings.
- Use colors and backgrounds to enhance text visibility.

- Choose meaningful words for links and menus.
- Apply anti-aliasing or dithering for smoother text edges.
- Experiment with drop shadows.
- Surround headlines with white space.
- Use color, word art, or large drop caps for attention.
- Try drop caps and small caps. - For center alignment, keep line width narrow.
- Accept criticism and double-check font style and size.
- Ensure text links and menu items are meaningful.
- Avoid using distracting colors (e.g., red text with green underline).
- Highlight ideas with bold or emphasis but avoid hyperlink-like text.
- Place vital elements in the top 320 pixels of the webpage.

Menus For Navigation

A project or web site should include:

1. content or information.
2. navigation tools such as menus, mouse clicks, key presses or touch screen.
3. some indication or map of where the user is in the presentation

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Buttons for Interaction

Buttons: objects that make things happen when they are clicked.

Things to consider:

1. Use common button shapes and sizes.
2. Label them clearly
3. BE SURE THEY WORK!

Fields for Reading

Reading from a computer screen is slower than from a book.

People blink 3-5 times/minute, using a computer and 20-25 times/minute reading a book.

This reduced eye movement causes fatigue, dryness.

Try to present only a few paragraphs per page with font that’s legible.

Display whole paragraph on screen and avoid breaks in between paragraphs.

Portrait vs. Landscape

Monitor use wider-than-tall aspect ratios called landscape.

Most books use taller-than- wide orientation, called portrait (like phones).

Don’t try to shrink a full page onto a monitor

Solutions to work with a block of text that is taller than what will fit :

1. Put the text in a scrolling field (Web Browsers).
2. Put text into a single field or graphic image in a project widow and let the user move up and down based on command.
3. Break the text into fields that fit on monitor, design control buttons to flip through the pages.
4. Design the project for a special monitor that’s taller than its width

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eBooks,E-Readers and Tablet Computers

eBooks: books digitized and formatted to be read using a E-Reader.

E- Readers display text, graphics and multimedia using

1. E-Ink screens between 5” and 10“ diagonal
2. Touch screen
3. WIFI
4. 3G Connectivity.

Ex:

1. iPad
2. Sony Reader
3. Google Nexus

4. CyBook
5. Jet Book
6. Kindle

The E- Ink screen is designed to imitate the appearance of ordinary ink on paper (“Electronic Paper”).

E-Ink is not required to read books, as they can be viewed on most computers and many personal Digital Assistants.

HTML Documents

Hyper Text Markup Language (HTML): The standard document format used for displaying text pages on the Web.

We can specify typefaces, size, color and other properties by “Marking Up” the text in document using Tags.

Ex : <*B> This Content is Bold

Cascading Style Sheets work in conjunction with HTML and provide Fine tuning and control of text and layout.

HTML Version 5 is a redesign that stretches into multimedia delivery tool, making HTML no longer just a text display tool with assorted attachment and plugged in objects.(+Introduction of CANVAS)

Computers and Text

Apple chose to use a screen resolution of 72Pixels per Inch. During the infancy of the Macintosh Computer's monitor H/W, (why)

- It was a standard measurement of printing industry

Also each pixel was made square shaped, providing even measurements in all directions.

Later Macintosh provided VGA video standard set for PC with 96 pixels per inch.

Font Wars are Over

Apple - Adobe PostScript page description font language features

1. describes an image in terms of mathematical constructs (Bezier curves)
2. Can be scaled larger or smaller
3. PostScript fonts can be drawn much faster than the old fashioned way.
4. 2 kinds of PostScript fonts : * Type3   ** Type1 .
5. Over 6000 Type1 fonts and they contain Hints (Special instruction for grid fitting to help improve resolution.)

Apple and Macintosh announced a joint effort to develop a “better and faster” font methodology – “True Type”.

In addition to printing smooth characters, could also draw characters to a low resolution monitor.

Based on Apple Technology, Licensed to Microsoft.

Adobe and Microsoft then developed a new and improved font managament system incorporating the features of PostScript and TrueType called the “Open Type”.

A free publicly available international standard.

Font Foundries

Typefaces are created at Foundry, a term much like case, that has carried over from times, when lead was poured into moulds to make letter faces.

Special Interest Groups (SIG) at America Online where people enjoy designing and making interesting font, post them online for others to download.

Sites :

www.typequarry.com
www.oldfonts.com
www.myfonts.com
www.will-barris.com

Character Sets & Alphabets

The ASCII (American Standard Code for Information Interchange) Character set :

7 bit character encoding system commonly used by computer system.

Assigns a number or value to 128 characters, including

1. upper case
2. lower case
3. punctuation marks
4. Arabic numbers
5. mathematical symbols.

Includes characters used for device control messages like carriage return, tab and so on.

Was invented and standardized for analog teletype communication early in the age of bits and bytes.

Extended Character Set

A Byte consists of 8 bits.

ASCII uses only 7 bits to code 128 characters, the 8th bit is left unused.

This extra bit allows to encode another 128 values for an extended character set.

Was filled by ANSI(American National Standards Institute) standard characters.