Nalanda Open University

Course Name: BCA Part II

Paper-XII (Multimedia & Animation)

Topic-Production Building Blocks

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Topic- Production Building Blocks (Unit -2)

Unit Structure

2.0 Objective

After going through this unit you will understand:

- The building blocks of multimedia.
- Different font editing and design tools
- File formats of text and sounds

2.1 Introduction

Multimedia production building blocks mainly deals with the usages of text, sounds and their file formats. In this unit you will learn how to use text in multimedia, various editing and design tools. The unit also shed lights on the working with sounds in windows. At the end of this unit you will able to describe the characteristics and attributes of text, graphics, sounds, animation and video elements that make up multimedia and specify the advantages and disadvantages of using these elements.

2.2 Using Text in Multimedia

Text is an important component used in many multimedia applications. They are characters that are used to create words, sentences and paragraphs. Text alone provide just one source of information. Yet, text is good at providing basic information.

It is the simplest, and often the most effective way to get one's message across. Insufficient attention given to the presentation and flow of text within multimedia application can result in the failure to communicate the presentation's central message.

Text consists of two structures:

- Linear
- Non-linear

Linear:

- A single way to progress through the text, starting at the beginning and reading to the end.

Non-linear:

- Information is represented in a semantic network in which multiple related sections of the text are connected to each other.
- A user may then browse through the section of the text, jumping from one text section to another.

Factors affecting legibility of text are:

- Size: The size of the text
- Background and Foreground color: The color in which the text is written in/on

- Style: Also known as typeface and font.
- Leading: Refers to the amount of added spaces between lines of type. Originally, when type was set by hand for printing presses, printers placed slugs, strips of lead of various thicknesses, between lines of type to add space.

Text technology are:

- Based on creating numbers and special characters.
- May also include special icon or drawing symbols, mathematical symbol, Greek letters etc.
- Text elements can be categories into:
    - Alphabet characters: A-Z
    - Numbers: 0-9
    - Special characters: punctuation [. , ; ‘ ….], sign or symbols [*&^%$#@!..]
    - Also known character sets.

2.2.1 Font Vs Typeface

A font is what you use, a typeface is what you see. Back in the good old days of analog printing, every page was laboriously set out in frames with metal letters. That was rolled in ink, and then it was pressed down onto a clean piece of paper. That was a page layout. Printers needed thousands of physical metal blocks, each with the character it was meant to represent set out in relief (the type *face*). If you wanted to print Garamond, for example, you needed different blocks for every different size (10 point, 12 point, 14 point, and so on) and weight (bold, light, and medium). This is where we get the terms *typeface* and *font*. In the example above, Garamond would be the typeface: It described all of the thousands of metal blocks a printer might have on hand and which had been designed with the same basic design principles. But a font was something else entirely. A font described a subset of blocks in that very typeface–but each font embodied a particular size and weight. For example, bolded Garamond in 12 point was considered a different font than normal Garamond in 8 point, and italicized Times New Roman at 24 point would be considered a different font than italicized Times New Roman at 28 point. The distinction between the two terms, and the processes they encapsulated, got muddied with the rise of desktop publishing. Fonts were no longer thousands of tiny blocks of movable type; they became digital computer files that scaled themselves up or down dynamically to whatever size or weight users wanted. So the distinction between process and end result disappeared in a puff of binary magic for most people.

Open up Microsoft Word and you're asked to choose a font, not a typeface. From the perspective of Microsoft's designers, this makes perfect sense. At any given time, after all, you're working in a specific size and weight of a typeface. This *is* the proper term. But from the perspective of millions of computer users who have never given a thought to type–outside of deciding what they want to use for their email signature or homemade birthday card–the word *font* has come to represent the *look*, not the mechanism. So the question is does it even matter anymore?

Even among type professionals, there's a growing acceptance that for most people, the terms *font* and *typeface* can be used interchangeably. Only experts really need to worry about it. The text elements used in multimedia are:

- Menus for navigation
- Interactive buttons
- Fields for reading
- HTML documents
- Symbols and icons

Menus for navigation

- A user navigates through content using a menu.
- A simple menu consists of a text list of topics.

Interactive buttons

- A button is a clickable object that executes a command when activated.
- Users can create their own buttons from bitmaps and graphics.
- The design and labeling of the buttons should be treated as an industrial art project.

Fields for reading

- Reading a hard copy is easier and faster than reading from the computer screen.
- A document can be printed in one of two orientations - portrait or landscape.

HTML documents

- HTML stands for Hypertext Markup Language.
- It is the standard document format used for Web pages.

- HTML documents are marked using tags.
- An advanced form of HTML is DHTML.
- DHTML stands for Dynamic Hypertext Markup Language.
- DHTML uses Cascading Style Sheets (CSS).
- Some of the commonly used tags are:
    - The <B> tag for making text bold faced.
    - The <OL> tag for creating an ordered list.
    - The <IMG> tag for inserting images.

Symbols and icons

- Symbols are concentrated text in the form of stand-alone graphic constructs.
- They are used to convey meaningful messages.
- Symbols used to convey human emotions are called emoticons.
- Icons are symbolic representations of objects and processes.

2.1.2 Using Text Elements in a Multimedia Presentation:

- Anti-aliased text must be used when a gentle and blended look for titles and headlines is needed.
- Ideas and concepts can be highlighted by making the text bold or by emphasizing text.
- A pleasant look can be created by experimenting with different font faces, sizes, leadings, and kerning.

2.1.3 Text applying guidelines:

- Be concise
- Use appropriate fonts
- Make it readable
- Consider type style and colors
- Use restraint and be consistent

2.1.4 Multimedia products depends on text for many things:

- to explain how the application work.

- to guide the user in navigating through the application.
- deliver the information for which the application was designed.

2.3 Computers and Text

- The font wars.
    - PostScript
    - TrueType

- Character sets.

PostScript

PostScript is a method of describing an image in terms of mathematical constructs. PostScript characters are scalable and can be drawn much faster. The two types of PostScript fonts are Type 3 and Type 1.

TrueType

Apple and Microsoft developed the TrueType methodology. TrueType is a system of scalable outline fonts, and can draw characters at low resolution.

Character sets

- The American Standard Code for Information Interchange (ASCII) is a 8-bit coding system. The extended character set is commonly filled with ANSI standard characters. The ISO-Latin-1-character set is used while programming the text of HTML pages. Unicode is a 16-bit architecture for multilingual text and character encoding. The shared symbols of each character set are unified into collections of symbols called scripts.

- Mapping across platforms:

    - Fonts and characters are not cross-platform compatible.

- They must be mapped to the other machine using font substitution.

2.4 Font editing and Design tools

- Macromedia Fontographer:

  Fontographer is a specialized graphics editor. It is compatible with both Macintosh and Windows platform. It can be used to develop PostScript, TrueType, and bitmapped fonts.
  It can also modify existing typefaces and incorporate PostScript artwork.

- Creating attractive texts:

  Applications that are used to enhance texts and images include:

  - Adobe Photoshop
  - TypeStyler
  - COOL 3D
  - HotTEXT
  - TypeCaster

2.5 Hyper media and Hyper text

- **Multimedia**

Multimedia is defined as the combination of text, graphics, and audio elements into a single presentation. When the user assumes control over the presentation, it is called interactive multimedia. Interactive multimedia becomes hypermedia when a structure of linked elements is provided to the user for navigation and interaction.

- **Hypertext system**

Hypertext is defined as the organized cross-linking of words, images, and other Web elements. A system in which words are keyed or indexed to other words is referred to as a hypertext system. A hypertext system enables the user to navigate through text in a non-linear way.

- **Using hypertext systems**

Information management and hypertext programs present electronic text, images, and other elements in a database fashion. Software robots visit Web pages and index entire Web sites.

Hypertext databases make use of proprietary indexing systems. Server-based hypertext and database engines are widely available.

- Searching for words.
- Hypermedia structures.
- Hypertext tools

Two functions common to most hypermedia text management systems are building (authoring) and reading. The functions of ‘builder’ are:

- Creating links.
- Identifying nodes.
- Generating an index of words.

Hypertext systems are used for:

- Electronic publishing and reference works.
- Technical documentation.
- Educational courseware.
- Interactive kiosks.
- Electronic catalogs.

2.6 Sounds: multimedia system sounds

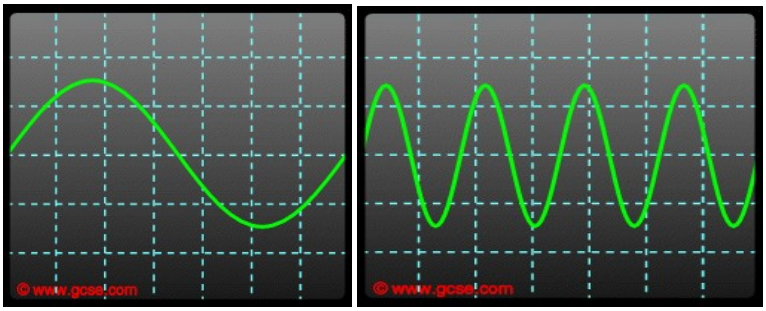
Vibrations in the air create waves of pressure that are perceived as sound. Sound comprises the spoken word, voices, music and even noise. Sound waves vary in sound pressure level (amplitude) and in frequency or pitch. ‘Acoustics’ is the branch of physics that studies sound. Sound pressure levels (loudness or volume) are measured in decibels (dB). A pleasant sound has a regular wave pattern. The pattern is repeated over and over. But the waves of noise are irregular. They do not have a repeated pattern. System sounds are assigned to various system events such as startup and warnings, among others. Macintosh provides several system sound options such as glass, indigo, laugh. In Windows, available system sounds include start.wav, chimes.wav, and chord.wav. Multimedia sound is either digitally recorded audio or MIDI (Musical Instrumental Digital Interface) music.

Sound is described in terms of two characteristics:

- Frequency (or pitch)
- Amplitude (or loudness)

Frequency

Frequency is a measure of how many cycles occur in one second. This is measured in *Hertz* (abbreviation Hz) and directly corresponds to the *pitch* of a sound. The more frequent vibration occurs the higher the pitch of the sound.



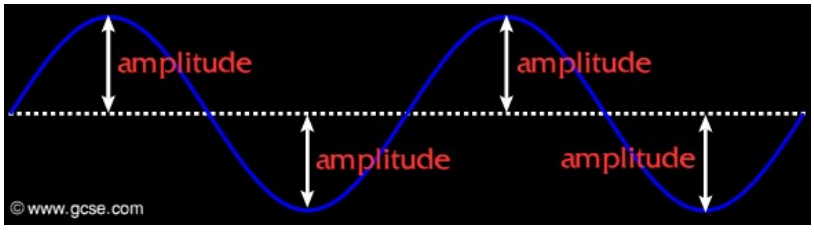
Low pitch High Pitch

Optimally, people can hear from 20 Hz to 20,000 Hz (20 kHz). Sounds below 20 Hz are infrasonic.

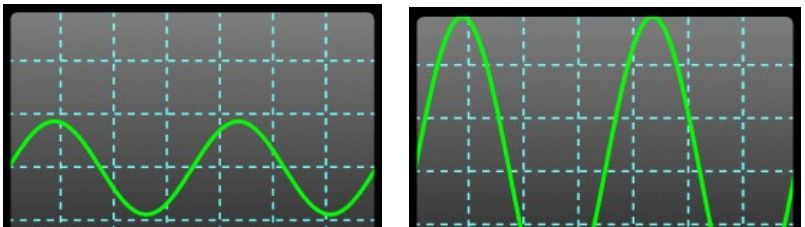
Sounds above 20 kHz are ultrasonic.

Amplitude

Amplitude is the *maximum displacement* of a wave from an equilibrium position. The louder a sound, the more energy it has. This means loud sounds have a large amplitude.

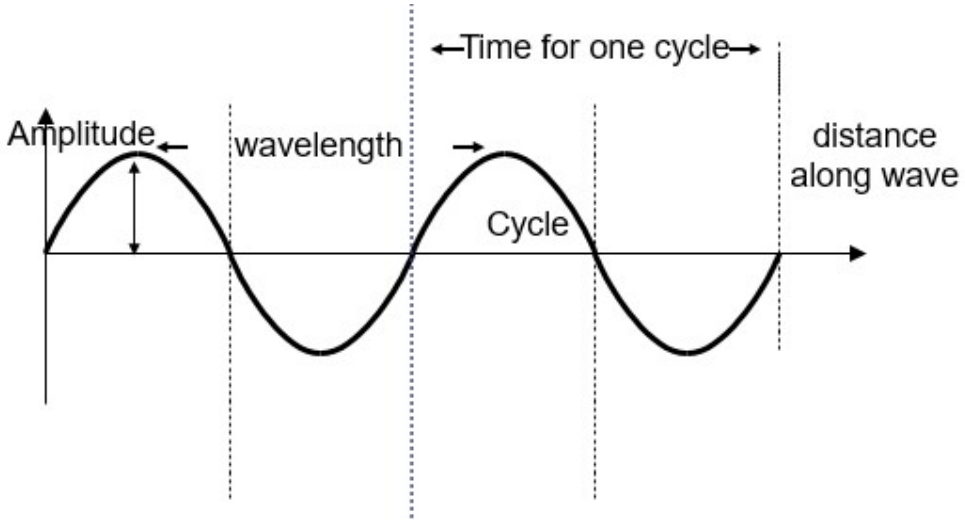


Low Quite



The amplitude relates to how loud a sound is.

Characteristic of Sound Waves



2.6.1 MIDI Audio

MIDI stands for Musical Instrument Digital Interface (MIDI). Before there was a wide use of mp3 and high bandwidth network, MIDI format audio is popular when an audio is required to be put on a website. Provides a standard and efficient, means of conveying musical performance information as electronic data. MIDI is a shorthand representation of music stored in numeric form. It is in the form of music score and not samples or recording. It is not digitized sound. Purposely for music a sequencer software and sound synthesizer is required in order to create MIDI scores. MIDI is device dependent.

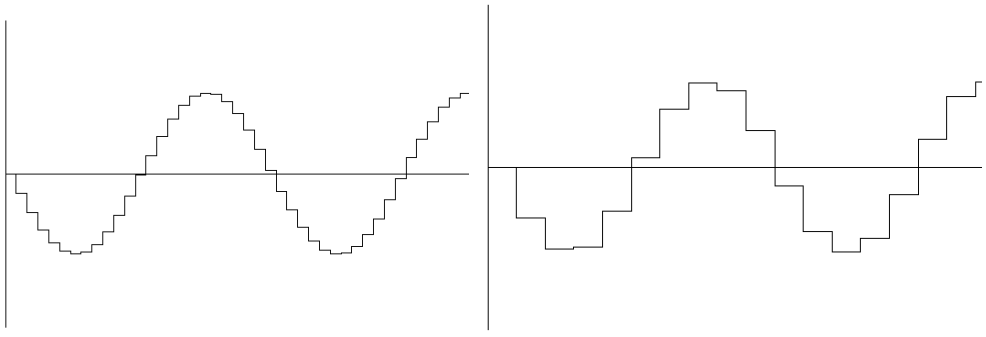
Since they are small, MIDI files embedded in web pages load and play promptly. Length of a MIDI file can be changed without affecting the pitch of the music or degrading audio quality. Working with MIDI requires knowledge of music theory.

MIDI files can be generated

- by recording the MIDI data using MIDI instrument (electronic keyboard) as it is played.
- by using a MIDI sequencer software application to record and edit (cut, paste, delete, insert).

2.6.2 Digital Audio

There are three sampling frequencies most often used in multimedia are 44.1 kHz, 22.05 kHz and 11.025 kHz. The higher the sampling rate, the more the measurements are taken (better quality). The lower the sampling rate, the lesser the measurements are taken (low quality). The number of bits used to describe the amplitude of sound wave when sampled, determines the sample size.



High Sampling Rate Low Sampling Rate

Quality factors for digital audio file:

- Sampling Rate
- Sample Size (resolution): the number of bits used to record the value of a sample in a digitized signal.
- Other than that, it also depends on:
    - The quality of original audio source.
    - The quality of capture device & supporting hardware.
    - The characteristics used for capture.
    - The capability of the playback environment.

Crucial aspects of preparing digital audio files are:

- Balancing the need for sound quality against available RAM and hard disk resource.
- Setting appropriate recording levels to get a high-quality and clean recording.

Audio resolution determines the accuracy with which sound can be digitized. Size of a monophonic digital recording = sampling rate x (bit resolution/8) x 1. Size of stereo recording = sampling rate x duration of recording in seconds x (bit resolution/8) x 2. Once a recording had been completed, it almost always needs to be edited. Basic sound editing operations include trimming, splicing and assembly, volume adjustments and working on multiple tracks. Additional available sound editing operations include format conversion, resampling or down sampling, fade-ins and fade-outs, equalization, time stretching, digital signal processing, and reversing sounds.

More advanced Digital audio editing software:

- One of the most powerful and professional PC-based packages is a tool called **Sound Forge.**
- Others audio editing software: COOL Edit Pro, Gold Wave, PROSONIQ SonicWORX, Samplitude Studio.

2.6.3 MIDI Versus Digital Audio

MIDI is analogous to structured or vector graphics, while digitized audio is analogous to bitmapped images. MIDI is device dependent while digitized audio is device independent. MIDI files are much smaller than digitized audio. MIDI files sound better than digital audio files when played on a high-quality MIDI device. With MIDI, it is difficult to playback spoken dialog, while digitized audio can do so with ease. MIDI does not have consistent playback quality while digital audio provides consistent playback quality. One requires knowledge of music theory in order to run MIDI, while digital audio does not have this requirement.

2.6.4 Audio File Formats

MIDI:

*.MID, *.KAR, *.MIDI, *.SMF

AUDIO DIGITAL:

WINDOWS □ *.WAV,

MACINTOSH □ *.AIFF

UNIX □ *.AU

REALAUDIO □ *.RA

MPEG3 □ *.MP3

2.7 Working with Sound in Windows

Windows provides functions that enable an application to add audio services. The multimedia audio functions were introduced in 16-bit Windows. Many of their features have been superseded by features in DirectX. For more information, see the DirectX documentation.

The following topics are discussed in the multimedia audio documentation.

- Audio Compression Manager
- Audio Mixers
- Musical Instrument Digital Interface (MIDI)
- Waveform Audio

2.7.1 Audio Compression Manager

This overview describes the services available in the audio compression manager (ACM) and explains the programming techniques used to access these services.

The audio compression manager adds system-level support for the following services:

- Transparent run-time audio compression and decompression
- Waveform-audio data format selection
- Waveform-audio data filter selection
- Waveform-audio data format conversion
- Waveform-audio data filtering

This section contains examples demonstrating how to perform the following tasks:

2.7.2 Audio Mixers

This overview presents general information about using audio mixer services. Audio mixer services control the routing of audio lines to a destination device for playing or recording. These services can also control volume and other effects. Many of the techniques required to use these services are similar to those for audio devices discussed in other multimedia overviews.

2.7.3 Waveform Audio:

There are several methods for adding sound to your application using waveform audio. The simplest method documented here is that of using the **PlaySound** function. Most of the other waveform-audio API elements are relatively low-level.

2.8 Notation Interchange File Format

The NIFF (Notation Interchange File Format) was completed in the Autumn of 1995. This is a standard digital format for the representation of musical notation. NIFF allows the interchange of music notation data between and among music notation editing and publishing programs and music scanning programs. NIFF aims to be the notational equivalent of the Midi file standard. It is a non- proprietary format available without licensing fees.

Its design is a result of combined input from a diverse group of commercial music software developers, musicology researchers, music publishers and experienced music software users. A lengthy consensus building process, which began in February 1994, has resulted in a very thorough design.

The key participants from the commercial sector are:

Passport Designs (Encore), San Andreas Press (Score), Musitek (MidiScan), Mark of the Unicorn (Mosaic), Twelve Tone Systems (Cakewalk), Opcode Systems, and TAP Music Systems/MusicWare (NoteScan). Originally, Coda Music Technology (Finale) were involved but in January 1995 withdrew from the project, with the intention of publishing their own Enigma format.

NIFF has two key advantages compared to previous efforts at a standard format:

- Many of the major forces in the commercial music software industry - and several of the largest music publishers - have shown a remarkable willingness to co-operate in the design of NIFF.

- Commercial music scanning programs are a recent addition to the software market. They require a common language with notation programs to avoid the enormous loss of detail that occurs when translating through MIDI files.

2.7.1 The main features of NIFF are:

- feature set based on SCORE
- division of graphical information into page layout and non-page layout information
- Extensible, flexible and compact design
- allows linking of MIDI data and notation
- follows the design rules of the Resource Interchange File Format (RIFF) definition language from
- Microsoft for new multimedia oriented file formats.
- platform independence of files

The original designers of the NIFF format set the goal of creating a practical, useable format in a short time frame. It was agreed that a solid, workable solution, even if it excludes some unusual situations, is preferable to no solution. Unusual situations will always arise since music notation is complex and open to interpretation.

The general strategy was to model NIFF's feature set on Score's, organise the data as systematically as possible, and use the most current file format conventions.

The NIFF structure can accommodate full music publishing systems, simpler music display systems, logical definition languages like DARMS, and music scanning programs. It allows representation of the most common situations occurring in conventional music notation, while allowing software developers to define their own extensions to handle the more unusual situations. The complete NIFF specification allows inclusion of embedded postscript files, fonts and special characters to allow interchange of features not otherwise defined in the format.

Extensibility, Flexibility, and Compactness

The NIFF data structure is designed to be extensible so that future alterations and expansion can be achieved relatively painlessly. Flexibility is another important property, as different software packages and their users will have different requirements from the standard. Finally, compactness of file size is an important consideration when anticipating file transmission over low-bandwidth lines (e.g. on the WWW).

Types of music information

NIFF can describe three types of music information: logical, graphical, and performance information (by using MIDI). Graphical information can also further be subdivided into page layout and non-page layout information.

The only required information in a NIFF file is logical information. NIFF is structured as a page-ordered format but it can deal with programs without page layout information (and systems such as DARMS which allow non-page layout information to be absent). NIFF allows performance information (by means of MIDI time values only) but this is also optional.

If complete graphical information is present in a NIFF file, it is up to the reading program to decide between observing the page layout and non- page layout information, or ignoring one or both types of graphic information in favour of its own defaults. If graphical information is absent from a NIFF file, the reading program is expected to provide its own intelligent defaults.

2.9 Adding Sound to Multimedia Project

File formats compatible with multimedia authoring software being used along with delivery mediums, must be determined. Sound playback capabilities offered by end user’s system must be studied. The type of sound, whether background music, special sound effects, or spoken dialog, must be decided. Digital audio or MIDI data should be selected on the basis of the location and time of use.

2.9.1 Advantages & Disadvantages of Using Audio

Sound adds life to any multimedia application and plays important role in effective marketing presentations.

Advantages

- Ensure important information is noticed.
- Add interest.
- Can communicate more directly than other media.

Disadvantages

- Easily overused.
- Requires special equipment for quality production.
- Not as memorable as visual media.

2.10 Summary

Multimedia is a combination of text, graphics, and audio elements. In this unit you learnt how we use text with computer. Different font and design tools were explained to use text and images for different applications like Adobe photoshope, TypeStyler, typeCaster and so on. You saw the basic difference between hyper media and hyper text. Finally, the unit explaned the difference between MIDI audio and digital audio.

2.11 Questions

1. Define the usage of text in multimedia.
2. Describe the font editing and design tools.
3. Describe the terms hyper media and hyper text.
4. Explain sounds in multimedia systems.
5. Discuss the differences between MIDI video and digital video.

2.12 Suggested reading

1. Text and Multimedia Messaging: Emerging Issues for Congress by Patricia Moloney Figliola.

2. Multimedia: Making It Work, Eighth Edition By Tay Vaughan.
3. Music, Sound and Multimedia by Jamie Sexton.