

CHAPTER 8

INTRODUCTION TO MULTIMEDIA

8.1 What is Multimedia?

Multimedia is a computer-based presentation technique that incorporates text, graphics, sound, animations, and video elements. A combination of these elements grabs the viewers' attention and retains it. The multi-sensory inputs address the different learning needs and styles of different users and enhance the entire experience for the user.

8.2 Multimedia Applications

Multimedia applications are being used in a variety of different fields. Some fields where multimedia is commonly used include entertainment, education, research, and business communications.

In the field of entertainment, multimedia is widely used to add special effects to movies. It is also used to create animated films and cartoon strips. Animated films such as Finding Nemo, Polar Express, Ice Age, Sindbad, Pandavas, Hanuman are popular with both adults and children. High-end graphics and animations are frequently used to make computer games thrilling and realistic. Such games are very popular and are found in most home and game arcades. A high-end extension of these games is the flight simulator that is used to train pilots.

The Multimedia Messaging System, or MMS, is an application that allows you to send and receive messages over cell phones. These are popularly being used to send and receive jokes, music, ringtones, pictures and sometimes even videos.

Multimedia also has an enormous impact on education. With the growing popularity of multimedia, sophisticated elearning packages are used to train and educate people world over. The most common version of such packages are the Computer Based and Web Based Tutorials (CBT/WBT). These are self-paced learning aids that are either available on CD-ROMs or on the Internet. As mentioned, these tutorials are self-paced. So, the learner can learn by himself, at a pace and time that he is comfortable with. Plus there is no instructor; the learner does not have to travel to a location to attend the class. This eliminates the logistical problems of getting together people from different parts of the world. Such trainings are also cost-effective when the same training has to be imparted over and over again. CBTs/WBTs today are used to cover a wide range of topics including orienting new employees joining an organization, training employees on new software applications and systems used in an organization.

Multimedia based training is also being extensively used to train and educate children in schools and colleges. For example, a physics student can use an interactive multimedia presentation to learn the basics of electronics and actually create and test a circuit board. Similarly, multimedia simulations are very effective in explaining difficult concepts and facts. Such media make learning more fun and effective.

The impact of information presented in a multimedia encyclopedia is several times greater than the same information presented in the printed version. For example, a video of Neil Armstrong landing on the moon with a sound recording of his first words has a much greater impact than anything that can be written in a printed book. The use of hyperlinks in such material makes it easier to search for and view related content. Such non-linear access to information definitely speeds-up the learning process and makes it more rewarding.

Multimedia is heavily used in the entertainment industry, especially to develop special effects in movies and animation for cartoon characters. Multimedia games are a popular pastime and these are software programs available either as CD-ROMs or online. Some video games also use multimedia features.

Multimedia applications that allow users to actively participate instead of just sitting by as passive recipients of information are called Interactive Multimedia. An example are interactive multimedia games. For instance, users can play a simulated multimedia soccer match without actually being on the field. The simulation is just an illusion, but it makes the users think that they are playing a real match. The environment is created by using input devices like joysticks and sensors and by using output devices like headphones and goggles. The various multimedia components are coordinated with a technique called virtual reality. They provide an environment which is experienced by users as similar to reality. This technique is used in some arcade games and also in flight simulators, to impart training to pilots, without having to go for a real flight.

Multimedia is also used for corporate communications and presentations. Context-relevant animations, images and charts help in grabbing the viewers attention and highlighting critical pieces of information in corporate presentations. Multimedia elements are also used in advertisements, product catalogs, and online magazines.

Multimedia applications are also widely used in the fields of engineering, medicine, and scientific research. For example, in engineering, multimedia tools are used for designing and testing new components and products. In medicine, doctors can get trained by viewing at a virtual surgery or by simulating a surgical procedure without endangering the life of a human being. Similarly, a scientist can look at the molecular model of a compound and manipulate it.

8.3 Multimedia Elements – Sound, Animation, and Video

It is true that there are many image formats. Some of them are GIF files, JPG files, Animated GIF files, MPEG files, Shockwave files and NxView files.

The two most common by far are GIF and JPG files. Both of these formats compress static (as opposed to animated) bitmap images. Photographs are typical examples of static images. Both the GIF and JPG formats compress the image in different ways. A JPG file uses a much more complex technique than GIF to compress images, like photographs, where the color of every pixel is different. A GIF file creates a perfect reproduction of the original, while a JPG does not.

GIF (Graphic Interchange Format) is limited to an 8-bit palette. GIF is best suited for storing simple graphic images with relatively few colors. However, it is not well fitted for photographic works. JPG scores over GIF in this area. Despite this GIF is still used extensively on the Internet and Multimedia applications because of the great reservoir of GIF images available and support for animation.

The JPEG (Joint Photographic Experts Group) image files are a lossy format. Nearly all digital cameras have the option to save images in JPEG format. The JPEG format supports full color and produces relatively small file sizes. The two categories of image file compression are: lossy and lossless. The lossy compression algorithm takes advantage of the limitations of the human visual senses and discards information that would not be sensed by the eye. The loss of information is tolerable, and in many cases goes unnoticed. JPG is a lossy compression of the image.

Vector graphics help in rendering the image effectively on the screen. Many vendors provide special hardware called vector graphics cards to improve the efficiency in the display of images.

Sound

The sounds that you hear are analog wave patterns. Two attributes control the characteristics of sound - amplitude and frequency. The volume is the height of each crest in the wave. The frequency, also called as the pitch, is the distance between the crests of the wave. The greater the distance, the lower is the sound.

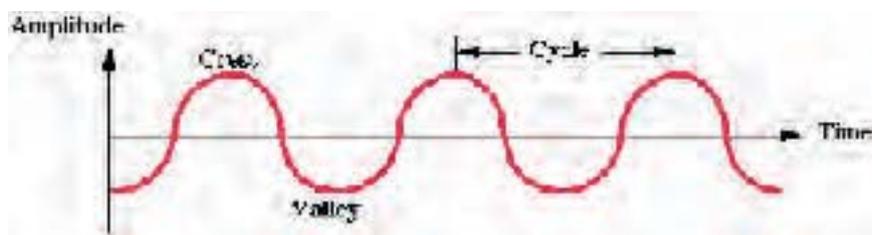


Fig 8.1 An Analog wave pattern

Before including sounds in an application, you have to convert the analog sound waves into a digital format. This conversion of analog sound waves to a digital format is called Sampling. You can further enhance the quality of the converted sound waves and add special effects, such as echo, fade in, and fade out effects, by using sound editing programs such as Sound Forge.

Sound can be stored in several different formats. You will learn more about these formats a little later in the chapter.

Animations

Animations are primarily used to illustrate or demonstrate an idea or a concept. Unlike videos that are usually taken from life, animations are based on drawings.

Animations can be two- or three-dimensional. Based on how 2-D animations are created, they can be broadly classified into the following two categories:

- Cel-based animations
- Object-based animations

Cel-based animations consist of multiple drawings, each one a little different from the others. When displayed in rapid sequence, these drawing appear to move.

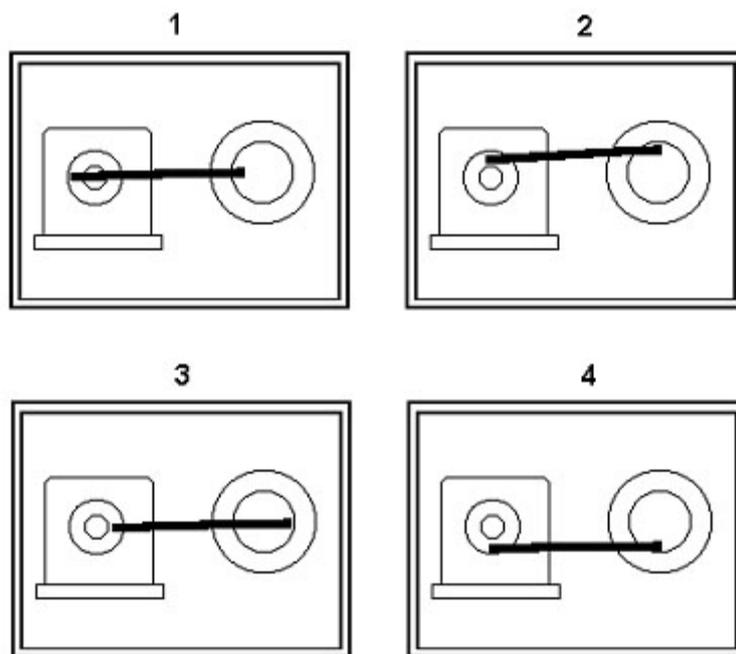


Fig 8.2 Cel-based Animations

Object-based animations, also referred to as slide or path animations, are created by moving an object across a screen. This type of animations are usually seen in computer games. For example, a ball moving across the screen.

Creating a 3-D animation is a 3-step process:

1. Modeling
2. Animating
3. Rendering

To create a 3-D animation, you have to first create the broad shapes and structures of the 3-D objects to be included in the animation. Then, you have to animate these models to define their motion. Finally, you have to render them by giving attributes, such as colors, and textures, to the objects.

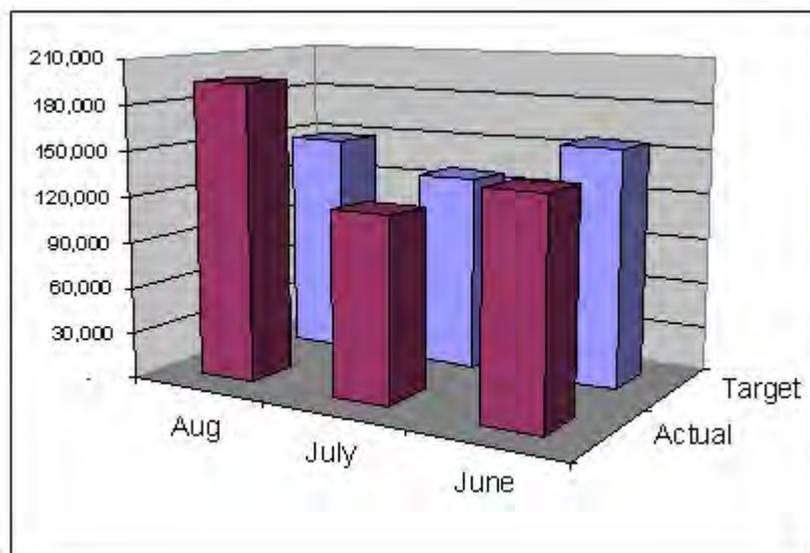


Fig 8.3 A 3-D Image

Once the animation is created, you can further enhance it by adding special effects such as morphing and warping. Morphing is a technique by which you can blend two or more images to form a new image. Warping is the technique of distorting a single image to

represent something else. Most modern multimedia applications, particularly games, combine these techniques with virtual reality to create an environment in which gives the viewer the feeling that he is part of that environment.

Video

Like sound, video is also recorded and played back as an analog signal. So, you have to convert the video signal into a digital format before including it in a multimedia application.

Video files tend to be very heavy. Several elements such as frame rate, image size, and color depth determine the size of these files. You can vary these elements to reduce the file size to acceptable levels. However, reducing the color depth to less than 256 colours results in the image looking murky. Similarly, reducing the frame count to less than 15 frames per second causes the video to look jerky.

You can also reduce the size of videos by compressing them. Compression is a technique by which a recurring set of information is identified and replaced by a single piece of information. There are two types of video compressions:

- Lossless compression – Retains the exact image throughout the compression.
- Lossy compression – Provides a comparatively higher ratio of compression but results in some loss of quality.

Popular Multimedia Formats

Some popular multimedia formats are as follows:

The MIDI Format

The Musical Instrument Digital Interface or the MIDI format is one that is commonly used for transferring music information between electronic music devices like synthesizers and sound cards in computers.

It was developed in 1982 and is a very flexible format that can be used for a wide range of musical applications. The MIDI format cannot contain sounds- it contains only digital notes. As a result, these files are relatively light. For example, a MIDI file that plays for approximately 5 minutes may be only 25 KB. This format is supported by most of the popular softwares in the market including all popular browsers.

Sound files in the MIDI format have the extension .mid or .midi.

The RealAudio/RealVideo Format The RealAudio format was developed by RealNetworks in 1995 and supports both sound and videos. This format is more popular for transfer of data over the Internet and allows you to stream files even over Internet connections with low bandwidths. However, the quality of these transmissions is often poor.

Files in this format have the extension .rm or .ram.

The AU Format The AU format is another sound format that is supported by most of the popular softwares in the market across different platforms. Files in the AU format have the extension .au.

The AIFF Format

The Audio Interchange File Format or AIFF format was developed by Apple. This is not a very popular format as it is neither cross-platform nor is it supported by all web browsers. Files in the AIFF format have the extension .aif or .aiff.

The SND Format

The Sound or SND format was also developed by Apple. Like the AIFF format, the SND files neither cross-platform nor supported by popular web browsers. Files in the SND format have the extension .snd.

The WAVE Format

The WAVE format was developed by IBM and Microsoft. It is one of the more popular formats as it is not only supported by all computers running the Windows operating system, but also by all popular web browsers. Files in the WAVE format have the extension .wav.

The MP3/MPEG Format

The MPEG format was developed by the Moving Pictures Experts Group. This MPEG format developed for video files while the MP3 format is used to store sounds (music). However, these formats have become one of the most popular format on the Internet in recent years. The main reason for the popularity of these formats is that they offer good compression and high quality. They are also cross-platform and supported by most popular web browsers.

Sound files stored in the MP3 format have the extension .mp3, or. mpga (for MPG Audio). Video files stored in the MPEG format have the extension .mpg or .mpeg.

The AVI Format

The Audio Video Interleave or AVI format was developed by Microsoft in 1992. It is supported by all computers running the Windows operating systems and by most of the popular browsers. It is a very common format on the Internet. Videos files stored in the AVI format have the extension .avi.

The Windows Media Format

The Windows Media format was developed by Microsoft. It is also one of the very popular formats on the Internet and on computers with the Windows operating system. It should be noted that this format requires the installation of an additional component in non-Windows computers. Files in the Windows Media format have the extension .wmv.

The QuickTime Format

The QuickTime format was developed by Apple primarily to store videos. It is a popular format on the Internet but requires the installation of an additional component in non-Windows computers. Files in the QuickTime format have the extension .mov.

The Shockwave Format

The Shockwave format was developed by Macromedia and is used to store multimedia components created using Flash. This format requires an extra component to play. However, this additional component comes preinstalled with the latest versions of Netscape and Internet Explorer. Files in the Shockwave format have the extension .swf.

Multimedia Hardware and Software

Most common personal computers are adequate to work with multimedia. However, some additional hardware and high resolution monitors would greatly enhance the effectiveness of using multimedia. Also special software such as Windows Media Player would help in viewing the multimedia presentations.

Creating multimedia content requires special software. Some commercial multimedia content development software are Flash,

Dreamweaver and Maya. More advanced multimedia hardware and software are available.

Inline Sound and Video

Sounds and video in multimedia applications can be played “inline” or by using a “helper”. How the sound or video is played depends on the HTML tags that you use. When sound or video is included as part of a web page, then it is called inline sound or video. The disadvantage of using inline sound or video is that it plays automatically whenever the web page loads without giving the viewer any control. You can add inline sound to a web page by using the `<bgsound>` and the `` tags. A helper application, also called as a Plug-in, is a program that can be launched by the browser to “help” play sound or video. The advantage of using helper applications is that you can allow the viewer control some or all of the player settings. For example, the viewer can control the volume settings, in addition to letting him rewind, play, pause, and stop the sound or the video.

Helper applications can be launched using the `<embed>`, `<applet>`, or the `<object>` tags.

Note: These tags are not standard HTML or XHTML tags. Some are supported by both Netscape and Internet Explorer while others are supported only by Internet Explorer. You can also include a hyperlink to a media file. When you do so, the browser will load a helper application, such as Window Media Player, to play the file.

8.4 Using Multimedia Elements in Content

Indisputably, including multimedia elements in content adds immense appeal to it. However, before deciding to include multimedia elements, it is essential to consider one major factor. This factor is the file size. Files with multimedia elements tend to be very heavy. For example, a 5-second audio file can be as heavy as 1MB. This, combined with the limitations of the medium of presentation can limit,

if not totally nullify the impact of the presentation. For example, a heavy video or animation file in a WBT may not load because of poor bandwidth. Or it may take so long to load that the learner loses interest and decides to move on to something else.

Here are a few tips that you can keep in mind while making such decisions.

Consider the appropriateness of using the element. Ensure that there is a justifiable need for every element that you include in your content and do not include any element without a compelling benefit from it.

Consider using alternate multimedia elements to provide the same impact. For example, consider replacing a heavy video file with a sound file and a static image.

Streaming the heavy audio and video files. During a regular HTTP transfer, the entire file is downloaded to the user's computer. When you stream the file, the user's computer is in constant contact with the server with the file.

Provide the viewer control over the multimedia element. For example, it is a good idea to include a skip button that allows the viewer to skip the introductory animation. Such a feature would be very popular with viewers viewing the content for a second time or third time.

Provide the view feedback about the status of download. Including a status bar that displays the percentage of download completed and the approximate time required to complete the task, will help in keeping the viewer engaged.

Display the multimedia element, particularly videos, in smaller windows.

Summary

- Multimedia applications are now becoming very popular
- These applications include text, sound and video to produce high quality products
- Popular uses of multimedia are in the areas of education, entertainment and presentations
- Special hardware and software for multimedia are now available in the market
- There a number of formats in which audio and video are used in multimedia applications.
- These formats are useful in including audio, video and other special effects in creating attractive web pages applications.
- Developing multimedia content is very challenging.

Exercises

1. Create a HTML page with text, audio, images and video.
2. Note the formats of the audio, images and video files provided in the accompanying CD.