

Unit 5

Multimedia Authoring & Compression

Contents

- Examples of Multimedia
- Requirements for Multimedia Authoring Tools
- Intramedia Processing
- Intermedia Processing
- Media Compression
- Need for Graphics Compression
- Graphics compression in relation to other media compression
- Mesh compression using connectivity encoding

Multimedia examples

Following are some examples that are often encountered in daily life

Multimedia Communication: This is the type that we most often encounter in everyday life because the main function of this type of multimedia is a medium to publish various important information to reach everyone.

Eg. Television, Radio, Internet, Film, Music, Game, Tutorial, Entertainment

Multimedia Content Production: The definition of multimedia content production is a type of multimedia that uses several different components, such as text, animation, audio, video, and images that are combined to produce multimedia content products such as :
Music, Game, Entertainment

Examples of Multimedia

Examples of Multimedia

- **Websites and Webpages**

- **Online Videos**

- **Interactive E-Books**

- **Video Games**

- **Educational Software**

- **Advertising and Marketing**

- **Virtual Reality**

- **Digital Art**

- **Social Media Posts**

- **Podcasts**

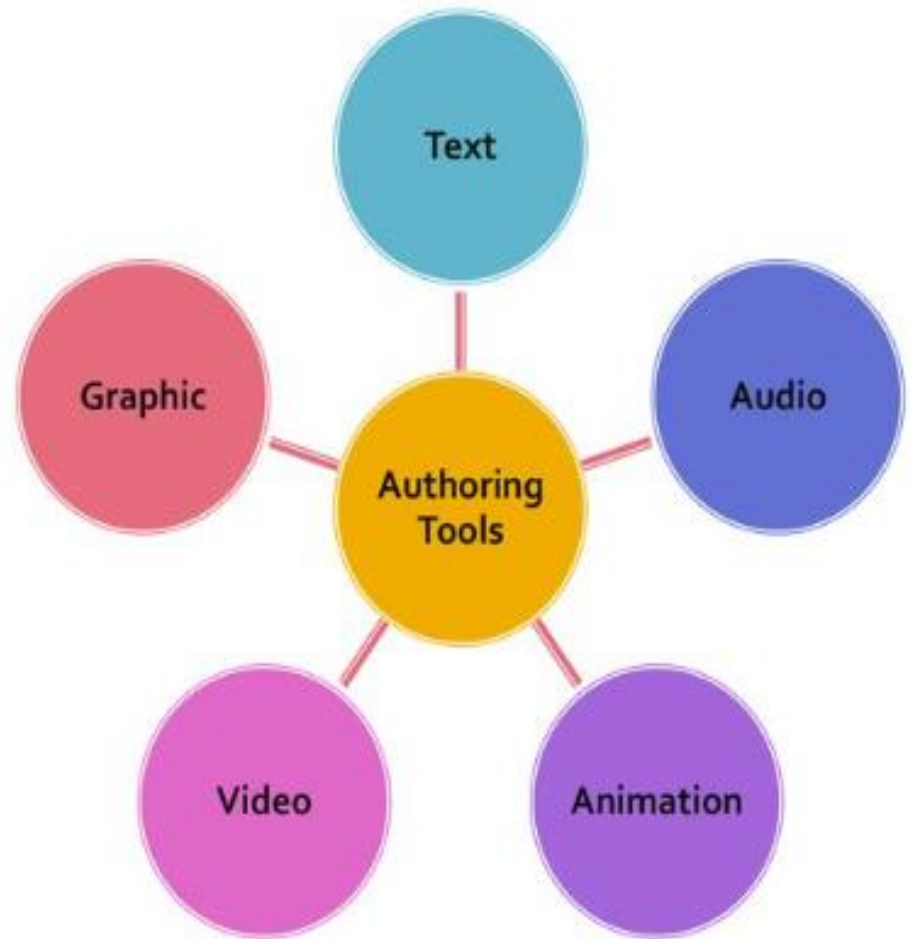
Examples of Multimedia

1. **Websites and Webpages:** incorporate text, images, videos, animations, and audio to provide an interactive and informative experience for users.
2. **Online Videos:** videos combine visuals, audio, and sometimes text to entertain, educate, or inform viewers on different topics. For eg: Youtube, Vimeo
3. **Interactive E-Books:** digital publications include not only text but also images, audio, and video which provide a more immersive reading experience.
4. **Video Games:** combine graphics, and audio, and often incorporate storytelling to create immersive and engaging experiences for players.
5. **Educational Software:** educational software to make learning more engaging and effective. Interactive lessons often include videos, animations, and quizzes to help students understand complex concepts.
6. **Podcasts:** allows content creators to share information, stories, and discussions through spoken word and sometimes music or sound effects.
7. **Virtual Reality (VR):** combines visuals, audio, and sometimes haptic feedback to create realistic experiences
8. **Digital Art:** often combine elements like graphics, animations, and music to convey emotions and messages.
9. **Social Media Posts:** incorporate multimedia elements such as images, videos, and gifs to enable users to share their stories and experiences. For eg, Instagram and Facebook
10. **Advertising and Marketing:** Commercials, banner ads, and interactive promotions combine different media elements to understand consumers' attention and convey brand messages effectively.

Requirement for Multimedia Authoring Tools

- Multimedia authoring is a process of assembling different types of media contents like text, audio, image, animations and video as a single stream of information with the help of various software tools available.
- Common tasks to all multimedia authoring processes can be enumerated as follows:
 - Creating, editing, and making the individual media items that make up the presentation production ready
 - Assembling the items into a coherent presentation, including the specification of the temporal and spatial layout of the media elements
 - Specifying the interaction between the media elements, which often amounts to also delineating the flow of content as a viewer interacts with the presentation

- In short.
 - Multimedia authoring tools provide the framework for **organizing** and **editing** the elements of a multimedia project.
 - Authoring software provides an integrated environment for **combining** the content and functions of a project.
 - It enables the developer to **create**, **edit**, and **import** data.



Types of Authoring Tools

- Card or Page based authoring tools
- Icon based or Event driven authoring tools
- Time based authoring tools

Card or Page based authoring tools

- In these authoring systems, elements are organized as pages of a book or a stack of cards.
- These tools are best used when the bulk of your content consists of elements that can be viewed individually, for example the pages of a book or file cards in card file.
- You can jump from page to page because all pages can be interrelated.
- In the authoring system you can organize pages or cards in the sequences manner. Every page of the book may contain many media elements like sounds, videos and animations.
- One page may have a hyperlink to another page that comes at a much later stage and by clicking on the same you might have effectively skipped several pages in between.
- Some examples of card or page tools are:
 - Hypercard (Mac)
 - Tool book (Windows)
 - PowerPoint (Windows)
 - Supercard (Mac)

Card or Page based authoring tools

Advantages

- Easy to understand.
- One screen is equal to one card or one page.
- Easy to use as these tools provide template.
- Short development time.

Disadvantages

- Some run only on one platform.
- Tools are not as powerful as equivalent stand-alones.

Icon based or Event driven authoring tools

- Icon-based tools give a visual programming approach to organizing and presenting multimedia.
- First you build a structure or flowchart of events, tasks and decisions by dragging appropriate icons from a library.
- Each icon does a specific task, for example- plays a sound, open an image etc.
- The flowchart graphically displays the project's logic. When the structure is built you can add your content text, graphics, animation, video movies and sounds.
- A nontechnical multimedia author can also build sophisticated applications without scripting using icon based authoring tools.
- Some examples of icon based tools are:
 - Authorware Professional (Mac/Windows)
 - Icon Author (Windows)

Icon based or Event driven authoring tools

Advantages:

- Clear Structure.
- Easy editing and updating

Disadvantages:

- Difficult to learn.
- Expensive.

Time based authoring tools

- Time based authoring tools allow the designer to arrange various elements and events of the multimedia project along a well defined time line.
- As the time advances from starting point of the project, the events begin to occur, one after another.
- The events may include media files playback as well as transition from one portion of the project to another.
- The speed at which these transitions occur can also be accurately controlled.
- These tools are best to use for those projects, wherein the information flow can be directed from beginning to end much like the movies.
- Some example of Time based tools are:
 - Macromedia's Director
 - Macromedia Flash

Time based authoring tools

Advantages

- Good for creating animation.
- Branching, user control, interactivity facilities.

Disadvantages

- Expensive
- Large file size
- Steep learning curve to understand various features.

Intramedia Processing

-Intra means within a single place or thing

- The intramedia issues deal with processing an individual media type.
- Intramedia processing depends on the media type and typically makes use of dedicated software related to that media.
- This is a necessary step because most often the captured media, such as images and videos, need to be edited or formatted.
- For example,
 - Video captured often has undesirable parts that need to be edited out, parts where color and contrast need to be enhanced. Such specific video-related aspects are performed in a dedicated video editing tool such as Adobe Premiere or Apple Final Cut Pro.
 - Digital images captured via a digital camera might need to be cropped, resized, sharpened, filtered, and saved in other formats for use in a multimedia production. Adobe Photoshop is the software of choice for editing images.
 - Similarly, Autodesk Maya or 3ds Max is used to create 2D/3D graphics and animation content.
 - Adobe Audition is a good software tool used to edit and clean audio data.

All these examples show the need for captured media data to be transformed before it can be used in a presentation as is, or combined with other media elements. In general, a variety of commercial media software tools are used for the editing of individual media types.

Intermedia Processing - Inter means between two or more things

- Once the individual media types are available and production ready, they are brought into a multimedia-authoring tool.
- Here, all the individual media elements are assembled together to form a production.
- All authoring tools and processes ultimately publish the content in a specific format for viewing in a specific type of multimedia player.
- These formats and players might be based on proprietary technology or collective industry-determined standards. Proprietary formats and players include Adobe Flash Player, Windows Media Player, Viewpoint Experience Technology, or even interactive 2D/3D game engines, such as Quake, Nintendo platforms, and SONY PlayStations.
- Standards-based multimedia formats and players include DVD players and MPEG-4 players. The authoring tools that support exporting to these formats include commercial tools, such as Macromedia Director, DVD Studio Pro, Tribework iShell, iVAST iAuthor and iEncode, and so on.
- It is impractical to create a single authoring tool that will universally fulfill the needs of all the multimedia content and applications for various platforms used in different markets, for example, Web-based advertising, entertainment, gaming, education, enterprise. Every authoring tool is designed to serve a specific market and platform, and, hence, has specialized workflows and capabilities

Need of Media Compression

- The amount of digital media data that is produced in the form of text, video, audio, 3D graphics, and combinations of these media types is extraordinarily large, and the rate of creation increases every day.
- This growing mass of data needs to be stored, accessed, and delivered to a multitude of clients over digital networks, which have varying bandwidths.
- The need to compress media data is motivated by both storage requirements and transmission requirements.
- In earlier days of the information age, disk space was limited and expensive, and bandwidth was limited, so compression was a must.
- Today, inexpensive storage in a variety of forms is readily available, and high-bandwidth connections (DSL, fiber optics and T-1) are becoming more popular.
- However, the amount and type of information we consume has also increased many fold, with the use of images, audio, video, and graphical animations. Furthermore, modern applications, such as high definition video, require even larger bandwidths.

Media Compression

- The two concepts of storage and transmission of data might seem like two different areas, but the data economics are the same. Each bit, whether stored or transmitted, has a cost associated with it.
- Compression of media is, therefore, a necessity to make many applications work with respect to storage and networked delivery.
- To compress multimedia data, we look at data as containing information.
- Compression can be considered as a science that reduces the amount of data used to convey the same information.
- It relies on the fact that information, such as an image or video, is not a random collection of pixels but exhibits order and patterns. If this coherence can be understood or even modeled, the information can often be represented and stored/transmitted with a lesser amount of data.

Compression Techniques

There are TWO data compression techniques

Lossless compression techniques and Lossy compression techniques.

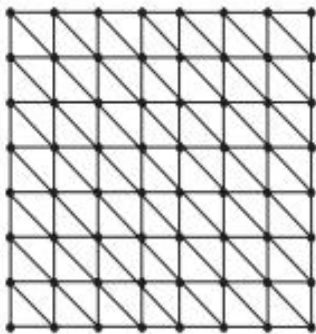
- **In Lossless compression**, as the name suggests, results in a compressed signal, which produces the exact original signal when decompressed.
- **In lossy compression**, the compressed signal when decompressed does not correspond to the original signal. Lossy compression produces distortions between the original and the decompressed signal.
- Both techniques can be used separately, or in a combined manner for various applications and have resulted in a variety of standards used to compress text, images, video, audio, and so on.

Graphics compression in relation to other media compression

- Graphics compression is a relatively new field compared with the other media types, such as image, video, and audio compression.
- Less attention has been devoted to 3D object and shape compression from research, industry, and standardization efforts, until recently when usage and complexities of 3D objects has grown in a variety of industries.
- All standard graphics processing is defined on triangulated meshes.
- To compress information in 3D meshes, it is important to recognize what constitutes information in the case of a mesh and, thereby understand what the redundancy here is.

Triangular Mesh (a triangle mesh is a type of polygon mesh)

- A bunch of triangles in 3D space that are connected together to form a surface
- • Geometrically, a mesh is a piecewise planar surface
 - almost everywhere, it is planar
 - exceptions are at the edges where triangles join
- It's a piecewise planar approximation of a smooth surface



Mesh compression using connectivity encoding

- A triangular mesh is represented by a set of mesh points and their interconnectivity.
- The mesh points are represented as 3D (x, y, z) positions and the interconnectivity is specified by edges.
- In such representations, the information is contained in the positions and the interconnectivity.
- Positional information is represented by a fixed number of bits for each x, y, z coordinate for each vertex.
- The connectivity information in a triangular mesh is represented by three indices per triangle and can be substantial depending on the number of triangles in the mesh.
- **Connectivity-encoding techniques** aim mainly to reduce the redundancy in connectivity information.

Thank you