MULTIMEDIA — An Introduction

Angel Gutierrez

http://www.csam.montclair.edu/~gutierre

gutierreza@mail.montclair.edu
To discuss…

✓ Course Issues
✓ Multimedia – Definitions
✓ Multimedia System
✓ Data Stream & Continuous media
✓ Streaming Media
✓ Multimedia - Applications
Course Issues

- Course Home
  - Check the Blackboard site for the course

- Text Books

  Ze-Nian Li & Mark S. Drew, "Fundamentals of Multimedia",
  Pearson Education, 2004

Additional readings & the class notes will be posted on the course page on a regular basis.
Check the page regularly.
Course Issues

- **Coverage**

<table>
<thead>
<tr>
<th>Topics</th>
<th>Number of Lectures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Multimedia</td>
<td>5</td>
</tr>
<tr>
<td>Compression and Standards on Image, Video, Audio. Need for compression</td>
<td>3</td>
</tr>
<tr>
<td>Multimedia OS, Multimedia Database Synchronization, Multimedia Communication Systems, etc..</td>
<td>5</td>
</tr>
<tr>
<td>Future Directions</td>
<td>1</td>
</tr>
</tbody>
</table>
Course Issues

- **Evaluation**
  - Test-1 - 25%
  - Final - 40%
  - Lab / Assignments / Project – 35% (no makeup) (Open Book)

- **Office hours**
  - Office : RI -319
  - Check the website: [http://pages.csam.montclair.edu/~gutierre/](http://pages.csam.montclair.edu/~gutierre/)
  - Email: gutierreza@mail.montclair.edu

- **Notices:**
  - Blackboard & Course Web site
Multimedia- Definitions

- **Multi** - many; much; multiple
- **Medium** - a substance regarded as the means of transmission of a force or effect; a channel or system of communication, information, or entertainment

(Merriam-Webster Dictionary)

○ So, Multimedia???
  - The terms Multi & Medium don’t seem fit well
  - Term Medium needs more clarification !!!

Multimedia Computing
(CSIT410)
Multimedia- Definitions

- Medium
  - Means for distribution and presentation of information

- Classification based on perception (text, audio, video) is appropriate for defining multimedia
Multimedia - Definitions

- Time always takes separate dimension in the media representation
- Based on time-dimension in the representation space, media can be
  - Time-independent (*Discrete*)
    - Text, Graphics
  - Time dependent (*Continuous*)
    - Audio, Video
    - Video, sequence of frames (images) presented to the user *periodically*.
    - Time dependent aperiodic media is not continuous!!
  - Discrete & Continuous here has no connection with internal representation !! (relates to the viewers impression….)
Multimedia- Definitions

- Multimedia is *any* combination of *digitally manipulated* text, art, sound, animation and video.
- A more strict version of the definition of multimedia do not allow just any combination of media.
- It requires
  - Both continuous & discrete media to be utilized
  - Significant level of independence between media being used
- The less stricter version of the definition is used in practice:
  - Development, integration and delivery of any combination of text, graphics, animation, sound, or video through a computer.
Multimedia- Definitions

- Multimedia elements are composed into a project using *authoring tools*.

- *Multimedia Authoring tools* are those programs that provide the capability for creating a complete multimedia presentations by linking together objects such as a paragraph of text (song), an illustration, an audio, with appropriate interactive user control.
Multimedia- Definitions

By defining the objects' relationships to each other, and by sequencing them in an appropriate order, authors (those who use authoring tools) can produce attractive and useful graphical applications.

To name a few authoring tools
- Macromedia Flash
- Macromedia Director
- Authorware

The hardware and the software that govern the limits of what can happen are multimedia platform or environment.
Multimedia- Definitions

- Multimedia is interactive when the end-user is allowed to control what and when the elements are delivered.

- Interactive Multimedia is Hypermedia, when the end-user is provided with the structure of linked elements through which he/she can navigate.
Multimedia- Definitions

- Multimedia is *linear*, when it is not interactive and the users just sit and watch as if it is a movie.

- Multimedia is *nonlinear*, when the users are given the navigational control and can browse the contents at will.
Multimedia System

- Following the dictionary definitions, *Multimedia system is any system that supports more than a single kind of media*
  - Implies any system processing text and image will be a multimedia system!!!
  - Note, the definition is quantitative. A qualitative definition would be more appropriate.
  - The kind of media supported should be considered, rather the number of media
Multimedia System

- A multimedia system is characterized by computer-controlled, integrated production, manipulation, storage and communication of independent information, which is encoded at least through a continuous (time-dependent) and a discrete (time-independent) medium.
Data streams

- *Data Stream* is any sequence of individual packets transmitted in a time-dependent fashion
  - Packets can carry information of either continuous or discrete media
- Transmission modes
  - Asynchronous
    - Packets can reach receiver as fast as possible.
    - Suited for discrete media
    - Additional time constraints must be imposed for continuous media
Data streams

• Synchronous
  ○ Defines maximum end-to-end delay
  ○ Packets can be received at an arbitrarily earlier time
  ○ For retrieving uncompressed video at data rate 140Mbits/s & maximal end-to-end delay 1 second the receiver should have temporary storage 17.5 Mbytes

• Isochronous
  ○ Defines maximum & minimum end-to-end delay
  ○ Storage requirements at the receiver are reduced
Characterizing continuous media streams

- **Periodicity**
  - Strongly periodic
    - PCM coded speech in telephony behaves this way.
  - Weakly Periodic
  - Aperiodic
    - Cooperative applications with shared windows

- **Variation of consecutive packet size**
  - Strongly Regular
    - Uncompressed digital data transmission
  - Weakly regular
    - Mpeg standard frame size I:P:B is 10:1:2
  - Irregular
Characterizing continuous media streams

- Contiguous packets
  - Are contiguous packets transmitted directly one after another/ any delay?
  - Can be seen as the utilization of resource
  - Connected / unconnected data streams
Streaming Media

- Popular approach to continuous media over the internet
- Playback at users computer is done while the media is being transferred (no waiting till complete download!!!)
- You can find streaming in
  - Internet radio stations
  - Distance learning
  - Cricket Live!!!
  - Movie Trailers
Streaming Media
Multimedia- Applications

Multimedia plays major role in following areas

- Instruction
- Business
  - Advertisements
  - Training materials
  - Presentations
  - Customer support services
- Entertainment
  - Interactive Games
Multimedia- Applications

- Enabling Technology
  - Accessibility to web based materials
  - Teaching-learning disabled children & adults

- Fine Arts & Humanities
  - Museum tours
  - Art exhibitions
  - Presentations of literature
Multimedia - Applications

In Medicine

Source:
Cardiac Imaging, YALE centre for advanced cardiac imaging
Multimedia - Applications

In training
Multimedia- Applications

Public awareness campaign

Source
Interactive Multimedia Project
Department of food science & nutrition, Colorado State Univ
References
Chapter 1