

CSE6392: Advanced Concepts in Multimedia and Video Processing

Objectives:

Multimedia and Video Processing is an advanced graduate level research-oriented course. The course is consistent with the current trends in the application of information technology in our daily lives. Multimedia refers to creation, compression, storage, and communication of more than one type of media (audio, video, images, text, graphics, animation, etc.). Digital video is the most demanding and difficult media to handle from computing point of view. Several ranges of applications exist that need and depend on multimedia information, and the spectrum of such application continues to expand.

In this course, we will learn some fundamentals of basic characteristics of image/video signals, coding techniques, motion estimation algorithms and implementations. We will also study various image/video coding standards such as JPEG, H.261, MPEG-1, MPEG-2/H.262, HDTV, H.263, MPEG-4, H.264, and Multi-view Video. We will learn about several applications such as videophone and conferencing, audio compression, content creation, and image search and retrieval. From system point of view, we will learn about video servers, multimedia networking and traffic Requirements, video streaming, wireless, quality of service, reliable multicast. Class notes and various books will be used in the course. Since the course is research oriented, it will include course projects.

Instructor:

Prof. Ishfaq AHMAD

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Appointment: Through E-mail

Course web page:

<http://ranger.uta.edu/~iahmad/cse6392.html>

Classroom:

To be announced

Time:

To be announced

Office hours:

To be announced

Grading Scheme:

mid-term project: 50%

Final Paper: 50%

Text:

Class Notes

Reference Books:

Digital Video: An Introduction to MPEG-2

Barry G. Haskell, Atul Puri, and Arun N. Netravali

Chapman and Hall 1997

MPEG Video Compression Standard

Edited by Joan L. Mitchell, William B. Pennebaker,
Chad E. Fogg, and Didier J. LeGall Chapman and Hall 1997

Videoconferencing and Videotelephony-Technology and Standards

Richard Schaphorst
Artech House, Inc. 1996

Compressed Video over Networks

Edited by Min-Ting Sun and Amy R. Reibman
Signal Processing and Communications Series, Marcel Dekker, Inc.

Multimedia Communications

Protocols and Applications
Franklin Kuo, Wolfgang Effelsberg and J.J. Garcia-Luna-Aceves

Prerequisite:

- (1) Basic knowledge of audio, video, networking
- (2) Knowledge of C++ or Java programming

Course Syllabus

Video

- 1) Introduction
- 2) Characteristics of Image/Video Signals
- 3) Basic Coding Techniques
- 4) Motion Estimation Algorithms and Implementations
- 5) Image/Video Coding Standards: JPEG, H.261, MPEG-1, MPEG-2/H.262, HDTV, H.263, MPEG-4
- 6) Other Video Signal Processing Topics

Multimedia

- 7) Videophone and Conferencing
- 8) Audio Compression
- 9) Content Creation
- 10) MPEG-4 System
- 11) Image Search and Retrieval
- 12) Video Servers

Multimedia Networks

- 13) Multimedia Traffic Requirements
- 14) Video Streaming
- 15) Wireless
- 16) Quality of Service

Cheating:

The homework and projects shall be your own original work and not copied from someone else or downloaded from a website. You may collaborate with students of your project group only. Cheating involves giving assistance to or receiving assistance from members of other groups, copying code from the web, etc. Any student caught cheating will be subject to the university's academic dishonesty policy.

UTA Academic Dishonesty Policy:

Academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form at The University of Texas at Arlington. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University. "Academic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts." (Regents' Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2., Subdivision 3.22) Institutional procedures regarding charges of academic dishonesty are outlined in Part II, Chapter 2, of the Handbook of Operating Procedures of The University of Texas at Arlington. Copies of the handbook are available at more than 75 locations on campus, including the Student Congress Office, the Library and departmental offices. The handbook also may be accessed at the following Web site: <http://ais.uta.edu:80/policy/hop.shtml>