Spring 2008

CS 790-01: Multimedia Coding and Communication (II)

Yong Pei
*Wright State University - Main Campus, yong.pei@wright.edu*

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CS 790 -01 – Multimedia Coding and Communication (II)
4 Credits, Spring Quarter 2008

Syllabus

Time/Place: Lecture: 8:00 – 9:15 PM, M/W, 153 Russ Engineering Center

Instructor: Dr. Yong Pei, Joshi Research Center
Tel. 937-775-5111, Email: yong.pei@wright.edu
Office Hours: 1:00-3:00pm, Tu.

Prerequisites: MTH 253 or MTH 355 (or equivalent)

Required Textbook:

Supplemental Readings:
• Recent journal and conference papers on Multimedia Compression and communications.
• Lecture slides will be posted through WebCT.

Course Objectives:
This Course is designed to introduce students to:
1. The theory and techniques of transform coding, subband coding and wavelets.
2. The state-of-the-art image coding techniques and industry standards, such as JPEG/JPEG2000, SPIHT.
3. Motion estimation techniques and Motion compensated compressions.
4. The state-of-the-art Image/Video coding techniques and industry standards, such as H.261/H.263/H.264, Motion JPEG2000, and MPEG2/MPEG4, MPEG21.
5. Error-resilient coding techniques.
7. Multimedia over Internet: Voice over IP (VoIP), and Video on Demand (VoD).
10. The evolution of data compression techniques and its impact on the economy and every-day life.
11. Computer tools and WWW resources, such as AVC, OpenH323.

Website: CS 790-01 in WebCT.

Grading: Project – 30 %
Homework – 10%
Midterm Exam – 30%
Final – 30%
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Lectures:  
The following tentative schedule defines in greater details what material is covered in the course and when it is covered.

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>Reference</th>
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| 1    | Introduction to Image/Video Compression  
      Video signal representation, | Notes              |
| 2    | Transform Coding  
      Transforms, Bit Allocation, Optimal Performance | Chap 12, Notes     |
| 3    | JPEG Image Compression Standard | Chap 13, Notes     |
| 4    | Subband/Wavelet Coding  
      Filters and Filterbanks, wavelets | Chap 14, Notes     |
| 5    | Bit allocation and optimal coding performance  
      EZW and SPIHT Compression  
      JPEG2000 Image Compression Standard | Chap 15, Notes     |
|      | **Midterm Exam**                                                      |                    |
| 6    | Motion Estimation Techniques  
      Temporal correlation and motion compensation  
      Differential methods, Blockmatching, Sub-pixel accuracy  
      Fast algorithm, Rate-constraint Motion Estimation | Chap 18, Notes     |
| 7    | Video Coding Standards  
      H.261/H.263  
      MPEG2/MPEG4 | Chap 18, Notes     |
| 8    | H.264 | Chap 18, Notes     |
| 9    | Error-resilient coding techniques.  
      Intra-Updating, Error Concealment  
      Joint Source-Channel (Network) Coding | Notes             |
|      | **Multimedia over Internet:**  
      Voice over IP (VoIP), H.323 and SIP  
      Video on Demand (VoD) | Notes             |
| 10   | Data compression techniques for sensor networks  
      Distributed Signal Processing and Source Coding  
      Slepian-Wolf / Wyner-Ziv Coding  
      Distributed image/video coding  
      Practical Distributed Source Coding techniques | Notes             |

**Final Exam**

* — topics to be selected according to the course progress.