Winter 2007

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

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CS 790 -01 - Multimedia Coding and Communication (I)
4 Credits, Winter Quarter 2007

Syllabus

Time/Place: Lecture: 8:00 – 9:15 PM, Tu. & Th.

Instructor: Dr. Yong Pei, 340 Russ Engineering Center
Tel: 937-775-5111, Email: yong.pei@wright.edu
Office Hours: 2:00-4:00pm, Wed.

Prerequisites: MTH 253 or MTH 355 (or equivalent)

Textbook (Required):

Reference:

Course Objectives:
This Course is designed to introduce students to:
1. The principles of efficient digital representation of analog waveforms and the practical application of these principles for data compression systems.
2. The theory and techniques of lossless compression, such as Huffman coding, arithmetic coding, predictive coding and dictionary techniques.
3. The theory and techniques of lossy compression, such as scalar quantization, vector quantization and differential coding.
4. The theory and techniques of transform coding, subband coding and wavelets.
5. The evolution of data compression techniques and its impact on the economy and every-day life.
6. The state-of-the-art data coding techniques and industry standards, such as JPEG/JPEG2000, SPIHT.
7. Computer tools and WWW resources, such as MATLAB.

Website: CS 790-01 in WebCT.

Grading: Project/Term Paper – 25 %
Homework – 20%
Midterm Exam – 25%
Final – 30%
# Lectures:

The following tentative schedule defines in greater details what material is covered in the course and when it is covered.

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<th>Reference</th>
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<td>Introduction</td>
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<td>Theory of Lossless Compression Entropy, Conditional Entropy, Source Coding Theorems</td>
<td>Chap 1, Notes; Chap 2, Notes</td>
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<td>3</td>
<td>Codes for Lossless Compression Huffman Code Arithmetic Code Run-length Code *Golomb-Rice Code *Lempel-Ziv Code</td>
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<td>4</td>
<td>Theory of Lossy Compression Rate-Distortion Theory and Quantization</td>
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<td>6</td>
<td>Scalar quantization Methods Predictive Scalar Quantization *Vector Quantization *Trellis Coding</td>
<td>Chap 8, Notes; Chap 10; Chap 9; Notes, Chap 9</td>
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<td>Transform Coding Transforms, Bit Allocation, Optimal Performance</td>
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<td>JPEG Image Compression Standard</td>
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<td>Subband/Wavelet Coding Filters and Filterbanks, wavelets Bit allocation and optimal coding performance *EZW and SPIHT Compression JPEG2000 Image Compression Standard</td>
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* — topics to be selected according to the course progress.