Handout #1
Sep 29. 2008

ECE 178: Digital Image Processing

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Teaching Assistant: Pradeep Koulgi (pskoulgi@umail.ucsb.edu)
Lectures: M & W, 12:30 – 1:45 PM, at BUCHN 1930.
Discussion Sessions: Fridays 12:00 – 12:50 PM.
Office Hours:
      Manjunath: Tuesday 3pm- 5pm or by Appointment
      T 9:00 – 10:00 AM (TA, Phelps 1435)
      W 10 - 11 AM (TA, Phelps 1435)
      R 3:30 – 5:30 AM (TA, ECI LAB)

Text Book: The required text book for this class is "Digital Image Processing", 3rd edition, by Gonzalez & Woods. The book has a website - http://www.imageprocessingplace.com/. It contains pointers to additional resources and you are encouraged to take a look. For reference, I indicate the chapters from this book (see syllabus below) but I will also be using materials from several sources—it is important that you attend the lectures and take good notes. There is a companion book, Digital Image Processing using Matlab, that emphasizes more of the MATLAB usage than the theory part.

About the course: ECE 178 is an introductory course in image processing. In this course, you will learn about digital images and how you can manipulate them. Open to students in Engineering. You should have good background in basic calculus. Preliminary topics such as basics of linear systems, linear and circular convolution, and 2-D Fourier transform will be introduced during the first two weeks. You are expected to learn and use MATLAB and the Image Processing Toolbox for your programming assignments.

No prior knowledge of MATLAB is assumed.

Grading Ploicy: 20% HWs, 20% Mid-term examinations, 15% project, and 45% for the final examination. <u>All home-works are required</u> (*a non-submission will affect your grade non-linearly*). The home works are due by 5 PM on the day they are due, in the appropriate HW box on 3rd floor, HFH.

<u>Those that are received late will not be graded and will not get any credit.</u>

Important Dates:
Mid-term exam I: Oct 22 (Wednesday), in class.
Mid-term exam II: Nov 10 (Monday), in class.
Final Exam: Wednesday, December 10, 2008 12:00 PM - 3:00 PM.

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Optimistic Topics-Schedule

Date	Topic	Reading
	PART I	
09/29 (L01)	Introduction	Ch. 1 & 2
10/01 (L02)	Matlab introduction, pixel relationhips and distance measures.	Ch. 2, handouts
10/03 (D)	Discussion: Image Processing using Matlab	Matlab handout
10/06 (L03)	Intensity transformations	Ch 3.1-3.3
10/08 (L04)	Histogram modification	Ch 3.3 HW #1 DUE
10/10 (D)	Discussion: Histogram equalization	
10/13 (L05)	Geometric transformation: introduction to registration/mosaicking project	Handout + Ch 2.6.5 discussion on image registration
10/15 (L06)	Spatial filtering: background on linear systems and convolution	Ch 3.4, slides HW #2 DUE
10/17 (D)	Discussion: Linear systems review, examples of 1-D and 2-D convolution	
10/20 (L07)	Image processing using spatial filtering: noise removal (mean, median filtering), edge detection (derivative and Laplacian filters), unsharp masking	Ch 3.5-3.6
10/22 (L08)	Midterm exam I	topics till 10/17 HW #3 DUE
	PART II	
10/27 (L09)	Filtering in frequency domain: Fourier transform review, sampling and aliasing	Ch 4.1 – 4.3
10/29 (L10)	2D DFT and properties	Ch 4.4 – 4.6 HW #4 DUE
10/31 (D)	Discussion: Transform properties	
11/03 (L11)	Filtering in frequency: convolution theorem, homomorphic filtering	Ch 4.7 - 4.9
11/05 (L12)	Wrap up of filtering, enhancement	HW #5 DUE
11/07 (D)	Discussion: Filtering in transform domain, examples	
11/10 (L13)	Midterm exam II	Comprehensive: all topics covered till 11/07
	PART III: Image/Video Compression	
11/12 (L14)	Image compression: basics	Ch 8.1 HW #6 DUE
11/14 (D)	Discussion: compression	
11/17 (L15)	Huffman/LZW/Arithmetic/runlength coding	Ch 8.2.1, 8.2.3-8.2.5
11/19 (L16)	Block transform coding	Ch 8.2.8 HW #7 DUE
11/21 (D)	Discussion: compression examples, project	
11/24 (L17)	DCT and JPEG	Ch 8.2.8
11/26 (L18)	Predictive coding	Ch 8.2.9 **Project Report DUE**
12/01 (L19)	Coding: discussions (video, wavelets, etc.)	
12/03 (L20)	Review and Misc	HW #8 DUE
12/05 (D)	Final discussion for the quarter	**Exam on Dec 10**