Handout #1
Sep 24. 2009

ECE 178: Digital Image Processing

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Teaching Assistant: Jim Kleban (jim_kleban@umail.ucsb.edu) (jim_kleban at umail.ucsb.edu)
Lectures: T & Th, 12:30 – 1:45 PM, at PSYCH 1902.
Discussion Sessions: Fridays 12:00 – 12:50 PM, GIRV 2127
Office Hours:

Manjunath: Thursdays 10am – 12 noon or by Appointment
M 9:00 – 10:00 AM (TA, Phelps 1435)
W 10 - 11 AM (TA, Phelps 1435)
R 4:30 – 5:30 PM (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. 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 and Quiz; 20% Mid-term examinations, 10% project, and 50% for the final examination. All home-works are required. The home works are due by 5 PM on the day they are due, in the appropriate HW box on 3rd floor, HFH.

Participation in the discussion session is required. *Students who miss more than two discussion sessions or two home works will get a D grade.*

Important Dates:
Mid-term exam I: Oct 20 (Tuesday), in class.
Mid-term exam II: Nov 12 (Thursday), in class.
Final Exam: Tuesday, December 08, 2009 12:00 PM - 3:00 PM.

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Optimistic Topics-Schedule

Date	Topic	Reading
	PART I	
09/24 (L01)	Introduction	Ch. 1 & 2
09/25 (L02)*	Pixel relationships, distance measures, spatial operations	**2.5, 2.6** (excluding 2.6.7)
09/29 (L03)	Matlab introduction	handouts
10/01 (L04)	Review of linearity, shift invariance; Intensity transformations	**3.1, 3.2**
10/02 (D01)	*Discussion session*	HW #1 DUE
10/06 (L05)	Histogram processing	**3.3**
10/08 (L06)	Spatial filtering: linear systems and convolution	**3.4**
10/09 (D02)	*Discussion: Histogram equalization*	HW #2 DUE
10/13 (L07)	Image processing using spatial filtering: noise removal, edge detection, unsharp masking	**3.5, 3.6**
10/15 (L08)	Part I review, Project discussion	**Chapters 1 – 3.**
10/16 (D03)	*Discussion: Linear systems review (1-D and 2-D)*	HW #3 DUE
10/20 (L09)	Midterm Exam I	
	PART II	
10/22 (L10)	Filtering in frequency domain: Fourier transform review, sampling and aliasing	**4.1, 4.2, 4.3**
10/23 (D04)	*Discussion*	
10/27 (L11)	1D/2D DFT and properties	**4.4, 4.5, 4.6**
10/29 (L12)	Filtering in frequency: convolution theorem, homomorphic filtering	**4.7, 4.8, 4.9**
10/30 (D05)	*Discussions: Filtering in transform domain, examples*	HW #4 DUE
11/10 (L15)*	Part II review	
11/12 (L16)*	Midterm Exam II	Part I and part II
	PART III: Image/Video Compression	
11/03 (L13)*	Image compression: basics	8.1
11/05 (L14)	Huffman/LZW/Arithmetic/runlength coding	8.2.1, 8.2.3-8.2.5
11/06 (D06)	*Discussions*	HW #5 DUE
11/17 (L17)	Block transform coding	8.2.8
11/19 (L18)	DCT and JPEG	8.2.8
11/20 (D07)	*Discussion: compression examples*	HW #6 DUE
11/24 (L19)	Predictive coding	Ch 8.2.9
11/26	Thanksgiving holiday	
12/01 (L20)	Wavelets	Selected sections from Chapter 7
12/03 (L21)	Review, project presentations	
12/04 (D08)	*Final discussion for the quarter*	**Exam on Dec 08** **Project Report DUE**