CASE WESTERN RESERVE UNIVERSITY
Case School of Engineering
Department of Electrical Engineering and Computer Science

EECS 490. Digital Image Processing (3)
Fall 2007 Course Information

Summary Description:
Digital images are introduced as two-dimensional sampled arrays of data. The course begins with one-to-one operations such as image addition and subtraction and image descriptors such as the histogram. Basic filters such as the gradient and Laplacian in the spatial domain are used to enhance images. The 2-D Fourier transform is introduced and frequency domain operations such as high and low-pass filtering are developed. It is shown how filtering techniques can be used to remove noise and other image degradation. The different methods of representing color images are described and fundamental concepts of color image transformations and color image processing are developed. One or more advanced topics such as wavelets, image compression, and pattern recognition will be covered as time permits. Programming assignments using software such as MATLAB will illustrate the application and implementation of digital image processing.

Prerequisite: EECS 246 or EECS 212 or EBME 308 or equivalent or consent of instructor.

Required Textbook: Digital Image Processing, 3rd Ed., Rafael C. Gonzalez and Richard E. Woods, Prentice Hall, 2008, ISBN 978-0-13-168728-8.
Lecture Schedule: TR from 4:30 - 5:45 pm in Nord 211.
Instructor: Prof. Frank Merat, Glennan 518, x4572 (flm@case.edu)
Instructor Office Hours: see course Web site
Course Web Site: http://vorlon.cwru.edu/~flm/eecs490f06/
Textbook Web Site: http://www.imageprocessingplace.com/

Basis of Grades
*Projects (**50 %**)*: Students may work together on homework assignments, but each student is required to turn in his/her own work.
*Mid-Term and Final Projects (**50 %**)*: Students will be expected to prepare papers on assigned topics as well as to give a short presentation/demonstration to the class.

Late Policy and Missed Assignments
Assignments are due in lecture on the specified date. However, due to the large number of ITN students this semester special arrangements special arrangements will be made to accommodate distance students.

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EECS 490. DIGITAL IMAGE PROCESSING
Fall 2007 Tentative Syllabus (Revised 8/28/06)

Notes:
1. Readings are from Digital Image Processing, 3th Ed., Gonzalez and Woods, Prentice-Hall, 2008.
2. Notes will be provided in class or in the Web site.

Date	Class	Agenda	Reading
8/28	1	Course Outline and Information; intro. to image processing	Ch.1
8/30	2	Image formation & sensing; sampling & quantization; MATLAB	2.1-2.4
9/4	3	MATLAB vectorization; point transformations	2.5, 3.1, 3.2
9/6	4	Histogram processing	3.3
9/11	5	Arithmetic/logic operations; spatial filtering; smoothing	3.4-3.6
9/13	6	Sharpening; Laplacian; unsharp masking	3.7
9/18	7	Gradient and other derivative filters	3.7.3
9/20	8	2-D Fourier transform; properties of the 2-D Fourier transform	4.1-4.2
9/25	9	Filtering in the frequency domain, time↔space relationships	4.2.3, 4.2.4
9/27	10	Lowpass, highpass and other filters	4.3, 4.4
10/2	11	Implementing the 2-D Fourier Transform; padding; correlation	4.6.3-4.6.4
10/4	12	The Fast Fourier Transform	4.6.5
10/9	13	Image restoration; noise, Image restoration	5.1,5.2
10/11	14	Noise reduction in the space and time domains	5.3-5.4
10/16	15	Image degradation; inverse filters; optimal filters	5.6,5.8
10/18	16	Geometric transforms; image registration and warping	5.11-5.12
10/23		FALL BREAK	
10/25	17	Image formation; geometric optics, camera calibration	notes
10/30	18	Color images; color spaces; color space transformations	6.1,6.2
11/1	19	Pseudocolor transformations	6.3
11/6	20	Color image transformations and color image processing	6.5
11/8	21	Morphological Image Processing	9.1-9.5
11/13	22	Image Segmentation; edge-based segmentation	10.1-10.3
11/15	23	Region-based segmentation	10.4
11/20	24	Depth: Stereo imaging, stereo matching, Shape from X	notes
11/22		THANKSGIVING HOLIDAY	
11/27	25	Edge, boundary and region representations	11.1-11.3
11/29	26	Linear algebra, principal component analysis	notes, 11.4
12/4	27	Dynamic vision; segmentation using motion, image flow, tracking	notes
12/6	28	Pattern recognition; image matching	12.1-12.2
12/12		FINAL PROJECTS DUE	