CS/BIONENG 6640 - Image Processing - Fall 2011

Instructor: Ross T. Whitaker
TA: TBA

Lecture Time: Mon,Wed 10:45PM-12:05PM

Place: MEB 3105

Text: Digital Image Processing, 3rd Edition , Rafael C. Gonzalez and Richard E. Woods, Prentice Hall, ISBN 013168728X

A nice reference text (optional): Digital Image Processing, Kenneth R. Castleman, Prentice Hall

Abstract:

This is an introductory course in processing grey-scale and color images --- taught at the graduate level. This course will cover both mathematical fundamentals and implementation. It will introduce students to the basic principles of processing digital signals and how those principles apply to images. These fundamentals will include sampling theory, transforms, and filtering. The course will also cover a series of basic image-processing problems including enhancement, reconstruction, segmentation, feature detection, and compression. Assignments will include several projects with software implementations and analysis of real data.

Class Schedule

Date	Lecture Number	Topic
8/22	L1-2	Intro to Probability and Images: Images, Points, Functions
8/29	L3-4	Histogram Analysis, and Mapping
9/5	L5-6	Histogram Equalization, Geometric Transformations
9/12	L7-8	Geometric Transformations and Warping
9/19	L9-10	Filtering with Neighborhoods
9/26	L11-12	Filtering with Neighborhoods
10/3	L13-14	Fourier Transforms and Filtering
10/10	*Fall Break*	
10/17	L15-16	Discrete Signals, Interpolation and Aliasing
10/24	L19-20	Midterm Exam on 10/26
10/31	L17-18	Image Reconstruction
11/7	L21-22	Object Detection
11/14	L23-24	Feature detection
11/21	L25-26	Compression
11/28	L27-28	TBA
12/5	L29	Review

12/14	FINAL EXAM	10:30am-12:30pm

Resources:

- Office hours:
  - Instructor office Hours: Wed 1:30-2:45pm, Thur 12:30-2:00pm. Office 3893 WEB.
  - TA Office Hours: TBA. Also, Email for appointment
- Mailing Lists
- The web pages associated with the book are here.
- Other Reading Materials
- Slides From Class
- Some notes on warping with TPS and projective transformations

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Reading Assignments

- 8/22/11-9/1/11: Chapters 1 and 2 in G and W
- 8/22/11-9/3/11: Review of Probability
- 9/25/11-1/29/11: 3.1 through 3.2 in G and W
- 9/27/11-2/05/11: Notes on geometric warping
- 10/8/11-10/17/11: Background notes on linear algebra
- 10/15/11-10/24/11: 3.3 through 3.7 in G and W
- 10/22/11-11/01/11: 4.1.1-4.9.5, 4.10, 4.11 in G and W
- 10/20/11-11/08/11: 5.1-5.9, 5.11.1-5.11.5 in G and W

Homeworks

- HW1 - practice

Tests

- Midterm and Final exams (see grading).
- Midterm Exam Example (Answers)
- Final Exam Example

Honor Policy

Students are expected to work on their own, as instructed by the Professor. Students may discuss projects with other individuals either in the class or outside the class, but they may not receive code or results electronically from any source that is not documented in their report. Students must write their own code, conduct their own experiments, write their own reports, and take their own tests. Any use of sources (for projects or tests) that are not specifically given to the student by the Professor or TA, must be discussed with the Professor or TA or documented in the report. Any student who is found to be violating this policy will be given a failing grade for the course and will be reported to the authorities as described in the University's Student Code.

Accommodations Policy

The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to

make arrangements for accommodations. All written information in this course can be made available in alternative format with prior notification to the Center for Disability Services.

Projects

Projects will be done by individuals on topics assigned approximately every 3 weeks by the professor (i.e. there will be approximately 4-5 projects). Projects will require submission of the project code and findings in an html format (in a directory readable by a web browser). Project programming will be done in either MATLAB (the basic package --- no extra toolkits) or C++ using the Vispack library for image I/O and basic image operations.

- Project directory

Grading

- Projects (4-6): 65%
- Midterm: 15%
- Final Exam: 20%
- Late policy on projects: 10 point deduction per week