CS 7960: Advanced Image Processing

Administrative Details and Syllabus

Spring 2011

Course Web Page: http://www.sci.utah.edu/~fletcher/CS7960/

Introduction. In-depth study of advanced methods and research topics of current interest in image processing and analysis. Covers PDEs, shape representations, deformable models (snakes, level sets), statistical shape analysis, scale-space and registration. Focus and list of topics might change from semester to semester.

Instructor. Tom Fletcher. Office: 4686 WEB. Email: fletcher@cs.utah.edu. Office Hours: Tue. 2:00-3:00pm, or by appointment.

Class Meetings. Tuesdays and Thursdays, 10:45 am – 12:05 pm, in WEB 1450.

Mailing List. Important announcements, such as assignment corrections or deadline changes, will be sent to the class mailing list (cs7960@list.eng.utah.edu). Students may also send email to everyone in class using this list. Of course, please do not spam your classmates! Only topics relevant to the class should be discussed. Sign up for the mailing list here: https://sympa.eng.utah.edu/sympa/info/cs7960.

Grading Policy. The final course grade is based on the projects (70% total), presentation (20% total), and class participation (10%). Letter grades are assigned as follows:

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<tr>
<th>Score Range</th>
<th>Grade</th>
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<tbody>
<tr>
<td>93-100</td>
<td>A</td>
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<tr>
<td>90-92</td>
<td>A-</td>
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<td>87-89</td>
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<td>83-86</td>
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<td>D+</td>
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<td>0-62</td>
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Homework assignments are due at 11:59pm on the given due date. Written assignments should be in pdf format, while coding assignments should be source files. Coding can be done in MATLAB (using only the base package, no toolkits), C++ (using Vispack), or R (http://www.r-project.org).

Late Policy. Late projects will be deducted -10pts the first week they are late and -20pts the second week they are late. Projects will not be accepted beyond 2 weeks late. You will get one “free pass” where you can turn in one of the projects up to a week late without a reduction in points.

Working Together. Students are welcome and encouraged to discuss course topics and project assignments outside of class. However, each student is required to write their own code and project reports. Do not copy another student’s code or report, and do not copy code or text from outside sources. Such copying will be considered cheating and will result in a failing grade in the course. For a detailed description of the university policy on cheating, please see the University of Utah Student Code: http://www.admin.utah.edu/ppmanual/8/8-10.html.

Students with Disabilities. The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you need accommodations in this 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.

**Syllabus.** The following topics will be covered. See the course web page for a detailed schedule.

- **Feature Detection**
  - Scale space
  - Gaussian derivatives
  - Nonlinear scale space and anisotropic diffusion
  - Differential invariant structure

- **Image Registration**
  - Deformable registration
  - Atlas building
  - Mutual information

- **Shape Analysis**
  - Shape representations
  - Theory of shape spaces
  - Shape statistics (means, variability)

- **Segmentation**
  - Level set segmentation (PDE)
  - Deformable models
  - Markov random fields
  - Mean shift