Syllabus

Title: Pixels: Computing with Images

Teaching Team: Steve Tanimoto (instructor), Evan Herbst (teaching assistant)

Meetings: MWF in MGH 030 (a 40-seat computer lab)

Textbook: *An Interdisciplinary Introduction to Image Processing: Pixels, Numbers, and Programs*, by Steven Tanimoto, published by MIT Press 2012.

Primary software: (1) PixelMath, which includes an embedded Python 2.5 interpreter, available free at http://pixels.cs.washington.edu/ and (2) Python 2.7, available at http://www.python.org.

Course Description: This course is an introduction to both image processing and Python programming. Students with or without prior programming experience are welcome.   Image processing as a field has intimate connections to mathematics, electrical engineering, the psychology of visual perception, the physics of light, computer science, and the digital arts. It also relates to many other disciplines. For example, it is used in astronomy (processing telescope images), medicine (e.g., CAT scanning, cancer screening from microscope images), manufacturing (automatic inspection), robot navigation, fine arts (style analysis, forgery detection, restoration), and archeology (artifact analysis).

The course will cover Python programming, including both basic and more advanced techniques, image representation, enhancement, filtering, geometric transformation, convolution, Fourier transforms, edge detection, Hough transforms, segmentation into regions, pattern classification, classifier training, morphing, inpainting, high-dynamic-range photography, and simple game design and implementation involving images.

Student activities will include in-class lab activities, programming and other homework assignments, and projects. Some class periods will include lectures, but typically there will be a mix of lab activities and presentations. There will be two quizzes but no final exam. There will be a final project, to be done in teams of 2, in which students can tackle a challenge of particular interest to them.

Course web homepage: http://www.cs.washington.edu/190d (The course web has more information about the course, including a schedule for the full quarter, and links to additional resources such as the Catalyst background questionnaire and our GoPost discussion forum.)

First assignment: Assignment 1 has three parts, the first about PixelMath, the second on Python, and the third on digital images and human vision. This is due on Sunday, April 7 at 11:00 PM. See the web pages for details.

Meet with the instructor: Please sign up for a 10-minute meeting with the instructor on the signup sheet. Doubling up is encouraged. You don't need to know the other person coming in at the same time. These meetings will help the instructor get to know you, as well as offer you an opportunity to ask questions about the course in a more private context than regular class meetings.