CS555/CS455 Introduction to Visual Information Processing (Fall 2012)

Department of Computer Science

SUNY at Binghamton

Instructor:	Dr. Lijun Yin
Time:	T, R 7:30pm – 9:00pm
Location:	EBJ23
Office:	N6
Office Hours:	W, F 9:00am – 10:00am
Email:	lijun@cs.binghamton.edu
Web Page:	http://www.cs.binghamton.edu/~lijun/CS555_Fall2012/2012Fall_CS555.html
TA	Mr. Kaoning Hu (khu1@binghamton.edu)
TAofficeHour:	*M, W (2:00pm – 3:00pm) at G25 of Engineering Building*
Blackboard	http://blackboard.binghamton.edu

Course Description

This course will introduce the visual information processing from Computer Science point of view. Topics include the fundamental theory and techniques
of image representation and modeling, image enhancement, image restoration, image transforms, image reconstruction from projections, and image compression. This course will also introduce algorithms developed in computer science applications such as object recognition (biometrics), robotic vision, multimedia, and bioinformatics.

Prerequisites: CS240, Math304 or equivalent courses.

Textbooks Recommended

We will be using the following major books as references:

- [1] Rafael C. Gonzalez and Richard E. Woods, **Digital Image Processing.** Prentice-Hall. 2008 (ISBN: 0-13-168728-x). (third edition).
- Some supplemental materials will be handed out in the class.

Course Requirements

Your grade will be based on the following criteria:

- Programming Assignments - 58%.

- Term Project - 38% (including proposal presentation, project presentation, and project paper report)
- Class attendance – 4%

Computer Facilities

Programming assignments and course project will be done in the MS windows or Linux systems, whichever you are most familiar with.

Syllabus

Please note that this syllabus is approximate, and subject to change. Programming assignments are due 2 weeks after they are assigned.

DATE	TOPIC	READINGS	ASSIGNMENT
09/4	Introduction	Class Notes (1) and Ch.1	
09/6	Visual Information fundamentals	Class-notes (2) and Ch.2	
	Programming for Image processing	Sample for Window (VS 2008) Sample for Window (VS 2010) Sample for Windows 2007 .Net Programming Sample for Unix Programming Program Handout Note-1 & Note-2	Assignment 1
	Image Enhancement	Class-notes (4) and Ch.3	
	Research Case Study on Scalable edge enhancement	Case study notes (5)	
	Filter and Scale Space	Ch.3 and class notes	
			Assignment 2 (Test Images)

	Cont'd	Ch.3 and Ch.10.1.3	Term Project Specification Term Project Topics
	Image transformation	Ch.4 and Ch.8.5.2 class notes	
	Cont'd		
	Cont'd	Ch.11.4; Ch.10.2.2	
	Color Theory	Ch.6 and class notes	Assignment 3 1. test images 2. Images
	Cont'd		
	Project Proposal Presentation		
	Project Proposal Presentation	Name List	Project proposal due
	Image segmentation, description and representation.	Ch.11.1, 11.2 Class notes Supplemental notes (deformable template)	
	Active Contour Region description	Supplemental notes (active contour) Ch.11.5, 12.3.3	
	Morphological image processing	Ch.9 Class notes	

	Morphological image processing		Assignment 4 Video frame data Test Image
	Pattern recognition	Ch.12 Class notes	
	Pattern recognition and motion detection, tracking (optical flow)		
	Multi-resolution processing and wavelet	Ch.8 and Class notes	
	Image and video compression H.264;	Ch.11.3.4 Class notes	
	Cont'd and Image Restoration	Class notes;	
	No class (thanksgiving)		
	Computer vision introduction (knowledge based vision, 3D construction, stereo vision)	Ch.7 and Class notes	
	Project Presentation/Demonstration	Name list for final presentation	
	Project Presentation/Demonstration		Project report due on December 21 by 11:00pm.

Advice

Start your term project early. That way if you have trouble, you can get help in time to finish your project by the due date. The standard rules on plagiarism apply. Late assignments and term papers will not be accepted (unless approved by the instructor).

This course is also offered under the articulation agreement between Binghamton University and SUNYIT. It is available to qualified students at Binghamton University via the distance learning system Enginet.