Spring 2008

BME 671 LATE VISUAL PROCESSING

Time and Place: T/TH 9:30 -10:50 AM, GFS 205
Course web site: https://blackboard.usc.edu

Overview

This class will give students a broad view of modern vision research, with a focus on late visual processing. A companion course, BME 670, was offered in the fall of 2007, focusing on lower visual processing. To ensure both depth and breadth of perspective in the course, two or more instructors with experimental or modeling backgrounds will cover each of the main topics. These topics were chosen to emphasize the particular strengths of USC vision researchers. The topics include cortical circuitry, the computations of orientation, motion, color, contour, segmentation, 3D depth, and faces, as well as visual and auditory perception, recognition, reading, attention, and learning. In total, eleven USC lecturers from different schools, departments, and disciplines will participate in this vision course. In addition, the course will have four speakers from other institutions. These latter speakers will deliver lectures devoted to open questions in each of the main topic areas.

Prerequisites

The courses will be limited to graduate students. Senior undergraduate students will be accepted only with prior approval of the instructors. Prerequisites will be either neuroscience (e.g., NEUR 524 or BME 502) or computer-vision (e.g., CSCI 574) courses.

Course Format

Students will be expected to read one article and answer one question per lecture. Articles and questions will be posted on the course web site prior to each lecture. Questions will be synthetic and will require 300 word answers (approximate length of a scientific abstract). Answers should be typeset rather than handwritten, and answers longer than 300 words will not be

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graded. Answers must be turned in at the next class after the associated lecture, at the beginning of class. Late answers will not be accepted or graded. Example answers written by the instructor will be posted on the course web site.

Exams

Exams will be closed book and will last approximately 90 minutes. They will be non-cumulative, covering material only since the previous exam, and will consist of both short-answer and synthetic questions. Exam dates are 2/21 (in class), 4/1 (in class), and 5/13 (during finals week, in the classroom).

Grading

Course grades will be assigned as follows:

Homeworks: 25%
Exams: 25% each, = 75%

Lecture Topics

1.	1/15	Introduction to Mid and High-Level Vision	Bosco Tjan; Psychology
2.	1/17	Organization of the Visual Cortex	Judith Hirsch; Biology
3.	1/22	Anatomy and Physiology of Cortical Area V1	Hirsch
4.	1/24	Direction and Orientation Selectivity	Hirsch
5.	1/29	Computational Models of Orientation Selectivity	Bartlett Mel; BME
6.	1/31	Open Questions in V1 Physiology	Dario Ringach, UCLA
7.	2/5	Neurally Inspired Models of Contour Extraction	Mel
8.	2/7	Cortical Measurement of Motion	Norberto Grzywacz; BME
9.	2/12	Perception of Motion: Psychophysics and Models	Zhong-Lin Lu; Psychology
10.	2/14	Decision Making in the Cortical Motion Pathway	Grzywacz
11.	2/19	Bayesian Models of Visual Inference	Tjan
12.	2/21	**Exam #1**	

13.	2/26	Open Questions in Bayesian Perceptual Inference	Alan Yuille; UCLA
14.	2/28	Visual Attention: Cortical Data and Models	Mel
15.	3/4	Perceptual Models of Segmentation	Grzywacz
16.	3/6	Computer Vision Models of Segmentation	Laurent Itti; CS
17.	3/11	Visual Memory and Learning	Lu
18.	3/13	Open Questions on the Role of Experience in Vision	Anthony Norcia; Smith-Kettlewell Institute
19.	3/25	Automatic Target Detection in Cluttered Scenes	Itti
20.	3/27	Models of Visual Plasticity	Grzywacz
21.	4/1	**Exam #2**	
22.	4/3	fMRI of the Visual Word Form Area	Franklin Manis, Psychology
23.	4/8	Reading	Tjan
24.	4/10	Audio-visual Mirror Neurons: Recognition of Actions	Michael Arbib, CS
25.	4/15	Participation in USC Vision Symposium	
26.	4/17	Visual Speech Perception	Lynne Bernstein, House Institute
27.	4/22	The Neural Basis of Object Recognition	Irving Biederman; Psychology
28.	4/24	Visual-recognition Impairments with Focal Brain Lesions	Jessica Wisnowski, Psychology
29.	4/29	The Neural Basis of Face Recognition	Biederman
30.	5/1	Open Questions in Adaptation and Face Recognition	Michael Webster; U. Nevada
31.	5/13	**Final Exam**, 8:00 a.m. - 10:00 a.m.	