Visual Object Recognition
Computational Models and Neurophysiological Mechanisms
Neurobiology 301
Harvard College/GSAS: 8402

FALL 2011

Meeting Time: Monday 3:30-5:30

First Meeting: Wednesday 08/31 3:30 pm BioLabs 1075

Location: BioLabs 1058

Instructor(s): Gabriel Kreiman
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Office Hours: Mondays 5:30-6:30
Course website: http://tinyurl.com/vision-class

Recommended prerequisites:
Life Sciences 1a (or Life and Physical Sciences A) and Life Sciences 1b (or equivalent)
Maa/Mab, Math1A,1B
Physical Sciences 1.

Course description:
Visual object recognition is essential for most everyday tasks including navigation, reading and socialization. Visual pattern recognition is also important for many engineering applications such as automatic analysis of clinical images, face or landmark recognition by computers and robots, security tasks and automatic navigation. In spite of the enormous increase in computational power over the last decade, humans still outperform the most sophisticated engineering algorithms in visual recognition tasks. This course will examine how circuits of neurons in visual cortex process represent and recall information. The course will cover the following topics: architecture of visual cortex, lesion studies, physiological experiments in humans and animals, visual consciousness, computational models of visual object recognition, computer vision algorithms.

Course Policies and Expectations:
The material will be discussed during the lectures. Students are expected to attend and participate in the lectures. In addition, there will be weekly homework as described below.

Materials and Access
Suggested books:
Assignments and Grading Procedures
Each week, students have to read, understand and discuss a scientific paper. The paper relates to the topics covered in the previous class and illustrates state-of-the-art research efforts in the field. Students are required to hand in a discussion of the reading assignment including one of the following (typically half a page to one page):
1) A critic of the paper including missing controls or alternative interpretation of the findings or a critical discussion of the findings
2) Two follow up questions (computational modeling or experiments or computer vision applications)
Do not copy and paste from the paper (the instructor has already read the papers...).
Homework is due (electronic format) before the beginning of each class.

Grading:
Homework: 80%
Class discussion: 20%

Course Schedule
A schedule and class-by-class overview will be posted in the class web site:
http://tinyurl.com/vision-class

Contact Information:
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