CPSC 689-603 Intelligent Neural Systems: Spring 2004

Syllabus

NEWS: *1/21/04, 11:13AM (Wed)*

- [1/21] Reading list has been uploaded.

Read-Only Bulletin Board.: 1/20/04, 07:03PM (Tue)

Page last modified: 1/21/04, 11:02AM Wednesday.

General Information   Resources   Reading List   Weekly Schedule   Lecture Notes

I. General Information

Instructor:

Dr. Yoonsuck Choe
Email: choe(a)tamu.edu
Office: HRBB 322B
Phone: 845-5466
Office hours: TBA

Prerequisite/Restrictions:

CPSC 625

Lectures:

MWF 12:40pm-1:30pm HRBB 126.

Introduction:

How does the brain generate intelligent (or complex) behavior? The focus of this course is to address this very question from various different perspectives. Select topics from computational vision, computational neuroscience, and cognitive science will be reviewed and critiqued. In the first few weeks, basic computational and mathematical preliminaries, as well as neuroscience basics will be covered. Afterwards, a selected collection of current research papers will be discussed. The course is designed to be open-ended to some degree, and a large portion of the time will be dedicated to discussion of the topics.

Goal:

The goal of this course is to

1. learn basic computational and mathematical tools for investigating the nervous system;
2. get acquaninted with diverse computational approaches to the understanding of brain function; and
3. explore how the seemingly disjoint topics can be integrated in a unique synthesis.

Textbook:

- Required: <u>paper collection</u> compiled by the instructor. Most of the papers are available online.
- Optional, but *highly* recommended: Michael A. Arbib (Editor), <u>"The Handbook of Brain Theory and Neural Networks"</u>, Second Edition, MIT Press, 2002
- Optional: Dana Ballard, <u>"Introduction to Natural Computation"</u>, MIT Press, 1997. .

Administrative Trivia:

1. Computer accounts: if you do not have a unix account, ask for one on the CS web page.
2. We will use Matlab(tm) (there is also an excellent open source clone called <u>GNU/Octave</u>). Matlab is installed on all SunOS machines (and also on the Windows machines -- I've got to check).

Topics to be covered:

See the <u>Weekly Schedule</u> section for more details.

- nervous system overview
- computational tools and basic theoretical concepts
- natural sensory statistics and neural coding,
- self-organization in neural networks,
- connectivity analysis in biological networks,
- active approach and analogy,
- understanding the behavior of dynamical agents, and
- semantics and the role of action in perception and cognition.

Grading:

1. Assignments (30%): about 3 short programming assignments (10% each).
2. Paper presentation (15%): each student will study and present a paper from the reading list. The term project may be loosely based on this paper.
3. Paper comments (15%): for the reading assignments each week, a brief (one paragraph) comment/critique must be submitted. Occasionally, the instructor will ask a specific question or ask the student to comment on a particular aspect of the paper.
4. Term project (40%): 6-7 page term paper describing the project, and project demo and a presentation (30 minutes + 10 minutes Q/A). The project can either be done individually or as a team of two.

   Grading will be on the absolute scale. The cutoff for an 'A' will be at most 90% of total score, 80% for a 'B', 70% for a 'C', and 60% for a 'D'. However, these cutoffs might be lowered at the end of the semester to accomodate the actual distribution of grades.

Academic Policy:

The TAMU student rules (<u>http://student-rules.tamu.edu/</u>), <u>Part I Rule 20</u> will be **strictly** enforced.

Students with Disabilities:

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the <u>Department of Student Life: Services for Students with Disabilities</u> in Room 126 of the Koldus Building, or call 845-1637. (The source of this passage is <u>TAMU Phil320 Syllabus</u>.)

Resources:

1. [Neural Networks: Sharewares and Freewares](#) (Thanks to Subru)
2. [Thalamus slices](#)
3. [Neuroscience Tutorial](#) at The Washington University School of Medicine. (Thanks to Barani)
4. [Research resources page](#)
5. [Ganeral reading list](#) (u: 689 p: showme): includes short blurb about how to find, read, and critique others' work. This list is **not** the course reading list.

III. Weekly Schedule and Class Notes

- **Lecture notes (in PDF format)**: all notes will be uploaded in this directory.
- It is **your responsibility** to download, print, and bring the notes to the class. Notes will be available 24 hours before each class.
- See the **2004 Spring TAMU Calendar** for breaks, etc. May 4th is the last class day (note that it is Tuesday).
- This is a very rough draft: More detail will be available as we go along.

Under heavy construction

Week	Date	Topic	Reading	Assignments	Notices and Dues	Notes
1	1/19	MLK Day (Holiday)				
1	1/21	Introduction				
1	1/23	Introduction				

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