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Summer 2009

CS 765: Foundations of Neurocomputation

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Foundations of Neurocomputation - CS 765
Summer 2009, Wright State University

Objectives and Goals

This course is designed to help you develop a solid understanding of neural network algorithms and architectures. At the end of this course you should be able to read and critically evaluate most neural network papers published in major journals, (e.g. IEEE Transaction on Neural Networks, Neural Networks, and Neural Computation). In addition, you should be able to implement a broad range of network architectures and learning algorithms for a variety of applications.

Prerequisites

* Familiarity with multivariate calculus, linear algebra and matrix algebra.
* Familiarity with algorithmic complexity concepts and programming.
* MATLAB experience desirable, but not necessary

Meeting Time and Place

Tuesday and Thursday, 4:10 PM – 5:25 PM

Instructor

John C. Gallagher
352 Russ Engineering
john.gallagher@wright.edu (email preferred to phone)

Office Hours

5:30 – 6:30 PM Tuesday/Thursday or by appointment

Textbook

The textbook for this course recently underwent an upgrade from 2nd to 3rd edition. The newer 3rd edition is significantly different than the 2nd edition and is the PREFERRED textbook for this offering of the CEG 765. However, because lower cost, used 2nd edition versions are still widely available, we'll support use of that version of the book as well. Class reading schedules will be provided for BOTH book editions. You do NOT need both books.

Note that future offerings of this course will be unlikely to continue supporing 2nd edition. 2nd edition books will not be useful to future students in this course.

Textbook Preferred Choice
Neural Networks and Learning Machines (Third Edition)
Author – Simon Haykin: Publisher – Pearson
http://www.amazon.com/Neural-Networks-Learning-Machines-3rd/dp/0131471392

Textbook Alternate Choice
Neural Networks A Comprehensive Foundation (Second Edition)
Author: - Simon Haykin; Publisher - Prentice-Hall, 1999
http://www.amazon.com/Neural-Networks-Comprehensive-Foundation-2nd/dp/0132733501

Programming Languages and Tools

The course will be programming language agnostic. You may complete projects and assignments using any programming environment you like, so long as the instructor has a way to compile and run your assignments. MATLAB and/or Octave are, however, particularly good choices for implementing neural networks. Familiarity with one or both is encouraged.

Grading

Student grades will be determined by assessment of each of the following:

i. ability to discuss the relative merits of contemporary neural network methods
ii. ability to implement and debug neural computation systems
iii. ability to identify and articulate open issues yet to be addressed

Each student will be provided with ample opportunity to demonstrate these abilities through written examinations, programming assignments, oral presentations, and a term project. We will use a standard 90/80/70/60 scale for letter grades.

Grades will be computed as follows:

3 Programming Assignments	30%
1 Term Project and Presentation	20%
1 Paper Review	10%
1 Midterm Exam	20%
1 Final Exam	20%

Programming Assignments

Students will be asked to complete three programming assignments. Each assignment will require implementation and test of specific neural network methods. Specific details will be available in the assignment handouts discussing each assignment.

Term Project / Presentation

Students will be required to complete *individual* term projects in which neural network methods are applied to a practical problem of interest to the student. Students will be expected not only to create and test solutions, but also explain how their solutions relate to ongoing research in the area. The instructor will provide project topics, but it is preferred that students develop projects directly related to their own personal research interests. Deliverables include an oral presentation to the class and a written document formatted as a conference paper. Additional details, requirements, and advice will be provided in lecture.

Paper Review

Students will be required to complete a critical review of a paper submitted to an IEEE conference in neural networks. The review will be in the style of those used to determine acceptance or rejection from the conference. Additional details, review templates, and advice will be provided in lecture.

Midterm Exam

The midterm exam will be given approximately half way through the quarter and will cover all material discussed in class up to the day of the exam. The exam will be designed to test breadth of knowledge on techniques and concepts. The exam will closed book, however, students will be permitted a single one-sided page of handwritten notes. The notes must be original copies (no photocopies of a common set of notes) and unique to each student in the exam.

Final Exam

The final exam will be similar to the midterm, except that it will cover all material covered in the course and students will be permitted TWO one-sided sheets of handwritten notes.

Academic Integrity

It is the policy of Wright State University to uphold and support standards of personal honesty and integrity for all students. The formal university code of student academic conduct can be viewed at :

http://www.wright.edu/students/judicial/integrity.html

PLEASE BE FAMILIAR WITH THE ACADEMIC CODE OF CONDUCT. If the instructor detects infractions, he will follow the procedures outlined in the formal university policy. These policies are easily available for review. Therefore, ignorance of the law is no defense.

Additional Information

Absences

Class attendance will not be a direct factor in student grades, but will strongly affect the quality of one's class experience. Students are expected to attend every class, as things may make less sense to students that do not attend class or who arrive late. Students registering after the term begins are responsible for all missed material and should not expect that due dates will be altered.

Office Hours

Office hours *are not private lectures.* It is expected that students attend and participate in lectures and use office hours for *additional discussion* of issues related to class topics. Related topics include clarification of lecture points, remediation advice, or expansion beyond textbook and lecture materials. You will get the most out of office hour visits by preparing *specific questions and/or examples ahead of your visit.* Make an attempt to solve problems on your own before coming to office hours even if you don't expect to solve the problem correctly. The instructor may be able to diagnose problems in understanding or execution – but only if there is attempted work available for examination.

Class Lecture Materials

Copies of the transparencies used in lecture, supplementary textbooks, and additional course-related information will be available on the course WWW page for student reference. Students are responsible for being aware of the WWW page's contents.. Students that do not have active computer accounts or are otherwise unable to access the course WWW page should contact the instructor so appropriate computer access arrangements can be made.

Additional Needs

Students with disabilities or any additional needs are encouraged to make an appointment with the instructor to discuss any accommodations that may be necessary. We enthusiastically work with the WSU Office of Disability Services (http://www.wright.edu/students/dis_services/) and strongly encourage you to consult with them as well.