Supervised Learning

Instructor: Prof. Jianlin Cheng

Department: Computer Science, University of Missouri, Columbia

Location: Pershing Dinning Hall C241; **Time**: MWF 11:00 pm - 11:50 pm; **Office Hours**: MWF: 3:00 pm - 4:00 pm in EBW 109

Semester: Fall 2015

Prerequisite: some machine learning or data mining background

Course Website: http://calla.rnet.missouri.edu/cheng_courses/supervised_learning/index.htm

Textbook (optional): Pattern Recognition and Machine Learning, Christopher Bishop, Springer, 2007.

Objectives:

This course covers the advanced supervised machine learning techniques used for classification and regression. The course intends to achieve two major goals. The first goal is to help students understand the theories of advanced machine learning methods. The second goal is to teach students how to apply these methods to solve a variety of real-world large-scale data analysis and pattern recognition problems such as text classification, image object recognition, and speech recognition.

Topics:

1. Introduction to machine learning and Bayes optimal learning rule
2. Learning distributions, parametric distribution, Maximum Likelihood Estimation (MLE) and Maximum a Posterior Estimation (MAP)
3. MLE, MAP, Bayes Optimal Classifier, Naïve Bayes Classifier, Generative Classifier
4. Discriminative classifier and logistic regression
5. Linear and non-linear regression
6. Nonparametric methods for density estimation, classification and regression
7. Model selection
8. Boosting
9. Support vector machines
10. Hidden Markov models
11. Deep learning
12. Conditional random field
13. Bayesian networks and graphical models
14. Semi-supervised learning

Homework:

The course has several supervised machine learning assignments (either theoretical or practical) and a comprehensive project of applying supervised learning methods to a real-world problem. Students are encouraged to propose a group project to work on. Each group may have up to three students. All the homework assignments should be submitted to mumachinelearning@gmail.com by the deadline. Late assignment receives an automatic score reduction of 20% of its total score per late day.

Grading:

Classroom participation (20%), assignment (30%), project report (20%), project representation (30%)

A grade scale for graduate courses (A+, A, A-, B+, B, B-, C+, C, C-, and F) is applied.

Intellectual Pluralism:

The University community welcomes intellectual diversity and respects student rights. Students who have questions concerning the quality of instruction in this class may address concerns to either the Departmental Chair or Institute Director or Director of the Office of Students Rights and Responsibilities (http://osrr.missouri.edu/). All students will have the opportunity to submit an anonymous evaluation of the instructor(s) at the end of the course.

Attendance Policy:

Attendance is essential to understanding the course material and is required. As in the workplace, if you cannot attend a class session due to illness or emergency please call or e-mail before the class to inform the instructor of your absence.

Academic Integrity:

Academic integrity is fundamental to the activities and principles of a university. All members of the academic community must be confident that each person's work has been responsibly and honorably acquired, developed, and presented. Any effort to gain an advantage not given to all students is dishonest whether or not the effort is successful. The academic community regards breaches of the academic integrity rules as extremely serious matters. Sanctions for such a breach may include academic sanctions from the instructor, including failing the course for any violation, to disciplinary sanctions ranging from probation to expulsion. When in doubt about plagiarism, paraphrasing, quoting, collaboration, or any other form of cheating, consult the course instructor.

Students with Disabilities:

If you anticipate barriers related to the format or requirements of this course, if you have emergency medical information to share with me, or if you need to make arrangements in case the building must be evacuated, please let me know as soon as possible.

If disability related accommodations are necessary (for example, a note taker, extended time on exams, captioning), please register with the Disability Center (http://disabilitycenter.missouri.edu), S5 Memorial Union, 573- 882-4696, and then notify me of your eligibility for reasonable accommodations. For other MU resources for persons with disabilities, click on "Disability Resources" on the MU homepage.