CSCI 557 Syllabus: Machine Learning, Spring 2016

Time

11:10 to 12:30 Tuesday and Thursday

Room

SS 362

Instructor

Dr. Douglas W. Raiford

Office

Social Science 420

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Office Hours

12:30 to 1:30 Tuesday and Thursday

Course Website

http://csweb1.umt.edu/~dougr/MachLearn.htm

Textbook

Machine Learning

Tom M. Mitchell

Author's Website

ISBN:	0070428077
Publisher:	McGraw-Hill Science/Engineering/Math; 1 edition (March 1, 1997)
Language:	English
ISBN-10:	0070428077
ISBN-13:	978-0070428072

Grading

Component	Percentage	
Quizzes	15%	18.75
Projects	65%	81.25%
Grad Research Project	20%	NA

Course Objectives

- Instill in the students an understanding of where machine learning sits in the hierarchy of artificial intelligence and soft computing techniques
- Provide a tool-kit of problem solving approaches that the students can take with them for use in future research or other programmatic endeavors
- Develop expertise in various learning algorithms such as Bayesian learning, decision tree learning, genetic algorithms, and neural networks
- Provide grounding by introducing generic learning principles such as inductive bias, Occam's Razor, and data mining, and the framework of learning from examples
- Experience interaction with other graduate students and the faculty member in discussing and exploring approaches to "learn" inductively from large, multidimensional datasets.

Prerequisites

CSCI 232 (CS 241) Data Structures and Algorithms (or consent of instr.)

Topics

1. Introduction/definition of machine learning
2. Concept Learning and the General-to-Specific Ordering
3. Decision Tree Learning
4. Artificial Neural Networks
5. Evaluating Hypotheses
6. Bayesian Learning
7. Computational Learning Theory
8. Instance-Based Learning
9. Genetic Algorithms
10. Learning Sets of Rules
11. Analytical Learning
12. Combining Inductive and Analytical Learning
13. Reinforcement Learning

Graduate Increment

Graduate students (attending CSCI 557) will have the added responsibility of completing a graduate level project. The motivation for this activity is to provide additional experience in the field of machine learning in such a way as to promote the student's ability to synthesize new approaches based upon the concepts encountered within the course.

The graduate level project will have three components to it: 1) a data component 2) a code component 3) an analysis component.

Around the 5th week of the course you must decide upon what you will do for your project, and submit a proposal. The ideal project is one where the student already has some data (and/or a computational goal) that is part of their graduate research. In this way they will be applying machine learning techniques to data and analysis that will assist them in their thesis work.

Policies

Late assignments

The students attending this class are at the graduate level, and are expected perform at this level. Assignment submissions should be on time. Failure to do so is an indication of poor time management and lack of effort. While each case will be treated independently, and the situation will be discussed with the student, a penalty of roughly a letter grade per day late will be imposed on the assignment.

Academic Dishonesty and the Honor Code

Ethics in academic activities are important at the University of Montana. We wish to graduate students who are responsible, hardworking, dependable, and who exhibit integrity and independence of thought.

The assignments and exams given in this course are designed to reinforce your learning and measure your understanding the topics covered in class. As such, the work you turn-in should be your own, and no one else's.

Overly similar work will be considered to be the result of copying. If you collaborate with another person for a graded assignment as in the example activities noted above, all parties involved will receive a zero for that assignment. If there are further assignments in which you have collaborated, the matter will be turned over to the Dean of Academic Affairs for possible university imposed sanction. It is, therefore, imperative that if you need help on your assignments that you contact your instructor or TA and NOT someone else. The official University policies can be found in the Student Conduct Code.

Accommodations

The Department of Computer Science is committed to equal opportunity in education for all students, including those with documented physical disabilities or documented learning disabilities. University policy states that it is the responsibility of students with documented disabilities to contact instructor DURING THE FIRST WEEK OF THE SEMESTER to discuss appropriate accommodations to ensure equity in grading, classroom experiences, and outside assignments.

The instructor will meet with the student and the staff of the Disability Services for Students (DSS) to make accommodations. Please contact Jim Marks in DSS (243.2373, Lommasson Center 154) for more information.

Religious observances

Religiously observant students wishing to be absent on holidays that require missing class should notify their professors in writing at the beginning of the semester, and should discuss with them, in advance, acceptable ways of making up any work missed because of the absence.

Excused Absences for University Extracurricular Activities

Students participating in an officially sanctioned, scheduled University extracurricular activity will be given the opportunity to make up class assignments or other graded assignments missed as a result of their participation. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled examination or other missed assignment for making up the work.