Syllabus for Pattern Recognition (CSCI 448/548)

Term
Fall 2015

Time
Tuesday-Thursday 9:40 to 11:00AM

Room
LA 338

Instructor
Dr. Douglas W. Raiford

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Social Science 420

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Office Hours
11:00 to 12:00

Instructor Website
http://hs.umt.edu/hs/faculty-list/faculty-details.php?id=1592

Grades

Grading Component	Undergrad	Grad
Homework	11%	10%
Quizzes	11%	10%
Two Exams & Final	39%	35%
Projects	39%	35%
Grad Student Project	NA	10%

Scale:

90 - 100	A
87 - 89	B+
80 - 86	B
77 - 79	C+
70 - 76	C
67 - 69	D+
60 - 66	D
00 - 59	F

Textbook
Pattern Recognition
Sergios Theodoridis and Konstantinos Koutroumbas
Author's Website
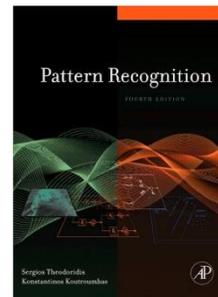
Publisher: Academic Press; 3 edition (March 10, 2006)
Language: English
ISBN-10: 0123695317
ISBN-13: 978-0123695314

Course Objectives

- Instill in the students an understanding of where Pattern Recognition 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 unsupervised learning algorithms such as clustering techniques (agglomerative, fuzzy, graph theory based, etc.), multivariate analysis approaches (PCA, MDS, LDA, etc.), image analysis (edge detection, etc.), as well as feature selection and generation.
- Experience interaction with other graduate students and the instructor in discussing and exploring approaches to discovering patterns in large datasets.

Prerequisites

Upper division or graduate status

Topics

1. Introduction/definition of pattern recognition
2. Overview of supervised vs. unsupervised learning techniques
3. Clustering overview (categories, proximity measures, etc.)
4. Sequential clustering approaches
5. Hierarchical clustering approaches
6. Cost function optimization clustering approaches
7. Probabilistic clustering approaches
8. Cluster validity metrics
9. Multivariate analysis techniques
10. Principal Components Analysis
11. Multidimensional scaling
12. Linear Discriminant Analysis
13. Image analysis techniques

Graduate Increment

Graduate students (attending CSCI 548) 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 pattern recognition 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 he or she will do for a 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 pattern recognition 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 or are experienced undergrads, and are expected to perform at these levels. 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, hard working, 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.