Course Syllabus

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Course Overview:

This course provides a broad introduction to machine learning and data mining, focusing on classic topics including supervised learning (discriminative/generative learning, neural networks, support vector machines); unsupervised learning (clustering, dimensionality reduction); ensemble learning (bagging, boosting); and fundamental issues in applying machine learning (model selection, evaluation). Lectures will discuss general issues in these topics and well-established algorithms, both from a computational aspect (how to compute the answer) and a statistical aspect (how to ensure that future predictions are accurate). *Note this class does not cover deep learning.*

Learning Objectives of the Course:

1. Be able to formulate machine learning problems corresponding to different applications.
2. Understand a range of machine learning algorithms along with their strengths and weaknesses.
3. Understand the basic theory underlying machine learning.
4. Be able to apply machine learning algorithms to solve problems of moderate complexity.

Evaluation of Student Learning

- **Quiz Participation [10% of final grade]**
  To keep track of student engagement and learning, there will be regular conceptual quizzes / surveys. These will be graded on completion rather than correctness -- where completion requires making a reasonable effort at responding to the questions. Judging completion is at the grading TA's discretion.

- **Assignments [50% of final grade]**
  Four assignments including programming portions and question answering portions will be given during the term. Additionally, a low-stakes homework "zero" will be given the first week to measure background knowledge. This is only worth a quarter of the other assignments.

- **Exams [40% of final grade]**
  There will be one midterm and one final exam -- each worth 20% of the final grade. Exams will be open book and administered during class time.

Grading scale

For final grades, the following scale will be used:

F	D	D+	C-	C	C+	B-	B	B+	A-	A

<=65	65-66	67-69	70-72	73-76	77-79	80-82	83-86	87-89	90-92	>93

Late Policy:

Late assignments will be accepted within the 48 hours of the deadline with a penalty. You will receive 95% of your regular grade for late submission submitted within 24 hours of the deadline. Late submission submitted between 24 and 48 hours past the deadline will receive 90% of your regular grade. No submission will be accepted after 48 hours. No late quizzes or exams will be accepted.

Textbook and materials:

There is no required textbook for this course. Reading materials and lecture slides will be posted on Canvas. Here are some recommended textbooks and resources:

- **A Course in Machine Learning by Hal Daume III (http://ciml.info/)**
- ***Pattern recognition and machine learning*** **(https://www.microsoft.com/en-us/research/people/cmbishop/#prml-book)**, by Chris Bishop. 1st edition. (CB)
- *Machine learning,* by Tom Mitchell (TM)

- The following resources would be helpful for reviewing some of the important concepts that will be used throughout the course:
  - Probability:
    - **A brief review of basic probability concepts (http://cs229.stanford.edu/section/cs229-prob.pdf)** from **Andrew Ng's standford ML class (http://cs229.stanford.edu/)** webpage.
  - Linear algebra:
    - **A geometric review of linear algebra (http://www.cns.nyu.edu/~eero/NOTES/geomLinAlg.pdf)**
    - **A brief review of linear algebra (http://cs229.stanford.edu/section/cs229-linalg.pdf)** from **Andrew Ng's standford ML class (http://cs229.stanford.edu/)** webpage.
    - **Math for Machine Learning (http://www.umiacs.umd.edu/~hal/courses/2013S_ML/math4ml.pdf)** by Hal Daume III
    - **Matrix Cookbook (https://www.math.uwaterloo.ca/~hwolkowi/matrixcookbook.pdf)** a great reference for matrix related derivations.
- If you prefer watching to reading when reviewing background concepts, here are some useful video lectures
  - **Khan Academy video lecture on vectors, matrices and spaces (https://www.khanacademy.org/math/linear-algebra/vectors_and_spaces)**

  - **Khan Academy video lecture on random variable and probability distributions (https://www.khanacademy.org/math/probability/random-variables-topic/random_variables_prob_dist/v/random-variables)**

- Other machine learning courses
  - **Andrew Ng's ML class at Standford (http://cs229.stanford.edu/)**
  - **Tom Mitchel's ML lectures (with video) at CMU (http://www.cs.cmu.edu/~tom/10701_sp11/lectures.shtml)**
  - **CMU ML course materials over the years. (http://www.cs.cmu.edu/~tom/10701_sp11/prev.shtml)**

Academic dishonesty

For assignments, you must do your own work entirely.

- You **MAY** discuss the meaning of assignments, general approaches, and strategies with other students in the course.
- You **MAY NOT** share assignment code, pseudocode, or documentation of any kind with any other student in the course.
- You **MAY NOT** show your assignment code to another student in the course for any reason.
- You **MAY NOT** ask another student for help debugging your assignment code.
- You **MAY NOT** use or copy code from any other source, including the Internet.
- You **MUST** write your own code for your assignments.

If you are found in violation of any of the above policies, whether you are the giver or receiver of help, you will receive a zero on the assignment or fail the course (instructor's discretion). The academic dishonesty charge will be documented and sent to your school's dean and the Office of Student Conduct. The first offense results in a warning; the second offense results in an academic dishonesty charge on your transcript, a disciplinary hearing, and possible expulsion.

Code of Student Conduct

All course interactions including but not limited to assignments, quizzes, projects, in-class discussions, and online posts are governed by the student code of conduct (**https://beav.es/codeofconduct (https://beav.es/codeofconduct)**).

Statement Regarding Students with Disabilities

Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at http://ds.oregonstate.edu. DAS notifies