EECS 738 Machine Learning

Instructor:

Name: Dr. Luke Huan
Office: 2034 Eaton Hall
Hours: M/W/F 1:00 – 1:50AM LEA 1136
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Office Hours: 2:00 – 3:00 Friday @ 2034 Eaton Hall

Catalog Listing:

Machine learning is “the study of computer algorithms that improve automatically through experience” (Tom Mitchell). This course introduces basic concepts and algorithms in machine learning. A variety of topics such as Bayesian decision theory, dimensionality reduction, clustering, neural networks, Markov decision theory, combining multiple learners, reinforcement learning, Bayesian learning etc. will be covered.

Prerequisites: Graduate standing in CS or CoE or consent of the instructor

Class Objectives:

1. Learn algorithms and theory in machine learning
2. Gain knowledge and hands-on experience of machine learning tools

Text Book:

There is no official text book for the class. Reading materials will be posted online at the class’s homepage. Major references are:


**Grading:**

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
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<tbody>
<tr>
<td>Take home background survey</td>
<td>1pt</td>
</tr>
<tr>
<td>Homework</td>
<td>20pts</td>
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<tr>
<td>Midterm Exam</td>
<td>40pts</td>
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<tr>
<td>Paper Presentation</td>
<td>10pts</td>
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<tr>
<td>Final Project</td>
<td>19pts</td>
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<tr>
<td>Class participation</td>
<td>10pts</td>
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<tr>
<td>Total</td>
<td>100pts</td>
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We will use the following scale to assign final grades (tentative and curving will be used):

- **A:** over 90%
- **B:** 80% - 89%
- **C:** 70% - 79%
- **D:** 60% - 69%
- **F:** below 60%

**Attendance:**

I expect you to come to lectures on a regular basis. While you are in classroom, please show courtesy to your classmate. You are responsible for all announcements made in class. Generally I will be unwilling to answer questions about material covered in a class you missed (unless you were sick or had another legitimate excuse). Class participation is strongly encouraged.

**Extra Credit:**

Extra credits will be given to creativity and/or additional efforts shown in the team project and exams. Details will be given in the related assignments.

**Late Assignments:**

Unless you have a previously approved excuse, the submission of late assignments is strongly discouraged. Late penalties: you lose 25% of your scores if the assignment was delayed by one day, 50% for two days, and 75% for three days. No late assignment will be accepted after three days.
Academic Misconduct:

The department, school and university have very strict guidelines regarding academic misconduct. Obviously, copying is not allowed on exams. Students are expected to submit their own work on individual programming projects. Lending or borrowing all or part of a program from another student is not allowed. Instances of cheating will result in a loss on one letter grade in the course and referral to the department chairman and the dean of engineering. If a second case of academic misconduct is reported in any class, a dismissal hearing may be initiated by the dean of engineering.

Class Contents (subject to change):

1. Introduction to machine learning
2. Probability, Laws of large numbers
3. Baye’s theorem, maximum likelihood estimation
4. Linear regression, MLE in linear regression
5. Linear classification
6. Support Vector Machines
7. Bayesian linear regression
8. Decision tree
9. Principle component analysis
10. Boosting
11. Reinforcement learning
12. Application of machine learning in different domains