EECS 940 Theoretic Foundation of Data Analysis

Instructor:

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Class Objectives:

We will review statistical and mathematical principles that are utilized in data mining and machine learning research. Covered topics include asymptotic analysis of parameter estimation, sufficient statistics, model selection, information geometry, function approximation and Hilbert spaces.

Prerequisite: EECS 738, EECS 837, EECS 844 or equivalent.

Text Book:

Recommended (not required):

Grading:

Homework assignments 20pts
One in-class presentation 30pts
Final Project: 30pts
In-class discussions 20pts
Total: 100pts

We will use the following scale to assign final grades (tentative and curving will be used):

A: over 90% 90%
B: 80% - 89% 89%
C: 70% - 79% 79%
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.

Attendance:

I expect you to come to lectures on a regular basis and will generally be unwilling to answer questions about material covered in a class you missed (unless you were sick or had another legitimate excuse). You are responsible for all announcements made in class. Participation is encouraged; please feel free to stop me if you do not understand something that has been said.

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. Students ARE allowed to borrow and modify any code on this class web site in their labs or programming projects. 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.

Topics Covered (subject to change during the course):

1. Real numbers, point set topology
2. Measure, σ-algebra
3. Functional space
4. Statistical decision theory
5. Maximum likelihood, Bayesian, Minimax
6. Linear regression
7. Logistic regression
8. SVM
9. Boosting
10. Other topics related to Machine learning and data mining