

Syllabus

Course: STOR 892.001, Data Driven Decision Models, Fall, 2018.

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Course Description:

This course will study decision models in the presence of data. A typical decision model involves optimizing an objective function (such as expected profit, loss, error probabilities, etc.) subject to constraints that must be satisfied by the decision variables. It also includes parameters that have to be estimated from the observed data. The objective function is typically produced by a stochastic model of the system. The parameter estimation is done using statistical procedures. An optimization algorithm is used to produce the optimum decisions. The recent trend is to merge these three stages into a single integrated entity that we call data driven decision model. Such a model uses a range of statistical procedures from classical statistical procedures (maximum likelihood, for example) to modern ones, (machine learning, for example). It exploits the interplay between the three stages to obtain superior solutions.

Target Audience: The course is designed for MS and PhD Students in Statistics and Operations Research, Business School, Computer Science, Biostatistics and related fields.

Course Prerequisites: The students are expected to be familiar with the graduate level basics of stochastic modeling, statistics and optimization. (For example, STOR 641, 664, 612 will suffice. If you don't have these, come talk to me.)

Course Goals and Student Learning Objectives: This course will study several decision models from the business world and healthcare to show how the state of the art is changing in the age of data mining and machine learning. The aim is to train the students in the general techniques of using data to make optimal decisions in their area of employment in the future.

Course Requirements: There will be no homework, since this a special topics class. The students will be evaluated on their regular participation and on the presentations they do in front of the whole class. There are no due dates for the presentations, except that they must occur before the last day of the lasses. There will be no home works. The student will be asked to do either a project or read a paper and present the results.

Policies and Course Structure

Grades: will be based on participation and presentations.

Participation: required on a regular basis.

Course policies: describe above

Attendance: not mandatory, but recommended.

Late work: not applicable.

Final exam date and time listed: no final exam

Resources: There is no textbook for this course. I will post the lecture notes and any other supplementary material on the course website.

Honor code: Working together is allowed and encouraged.

Syllabus:

The course will cover data driven decision models in

1. Inventory Management (weeks 1, 2, 3),
2. Offer Optimization (weeks 4, 5, 6),
3. Staffing of Service Systems (weeks 7, 8, 9),
4. Revenue Management and Dynamic Pricing (weeks 10, 11, 12),
5. Healthcare Management (weeks 13, 14, 15).