Syllabus: Math 567 Advanced Data Analytics Projects

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Course Format: Three meetings per week MWF 11:00-11:50 a.m. Class time is split (25/75) between lecture and team solutions to data analytic problems.

Learning Outcomes: At the completion of this course, the student will

1. Understand the objectives and basic methods of predictive analytics.
2. Be able to program core algorithms of predictive analytics.
3. Be able to apply the core predictive analytic algorithms to new problems.
4. Have gained experience in planning a data analytic project.
5. Have gained experience describing and communicating solutions and problems related to team-oriented problem solving.
6. Have gained experience writing reports on data analytic projects.
7. Have gained experience and understanding related to team-based problem solving.

Course Content:

The course is a data science capstone course, and it focuses on solving complex problems from the field of predictive analytics. The emphasis of the course is on developing practical solutions to the projects. Students are grouped in teams of ≈ three students for the purpose of solving problem. The problems originate from one of three sources: businesses, researchers, and competitions (private and public). A central focus of the course is communicating solutions to others in written and oral form. Most class sessions begin with the teams providing a short exposition on their progress, or lack thereof, since the previous class and a general discussion of next steps.

M 567(G) co-convenes with M 467(U). The course differs however. Graduate student are expected to work on and solve problem aspects that are substantially more difficult than those that undergraduates are responsible for. Furthermore, M 567 requires a significantly more sophisticated level of writing compared to M 467.


Prerequisites: M 461 or consent of the instructor.

Projects: Projects originate from three sources: businesses, researchers, and competitions (private and public) sponsored by companies and researchers. Students are organized in teams of usually three undergraduate students for developing solutions to a problem. Teams are necessary since the solutions are involved, sometimes requiring disparate methods from statistics, mathematics, and computer science. Solutions may require some innovation—some problems are not textbook problems with a methodological solution apparent from the start and no hidden difficulties. Students will work on two projects during the course of the semester.

Grading: Your course grade will be based progress toward completion of the project as well as participation level. Project grade is based on written reports and oral presentations (mostly short reports on progress). Written reports must discuss objectives, methods, results, and a conclusion. The reports will be posted on Moodle at intervals of 2-3 weeks for the other participants’ benefit. Oral presentations at
the project end are expository and aimed at communicating methods and results. There will be a final presentation during the final meeting time.

Each team will discuss once a week: progress, problems, and tasks for the following week. The team presenters are rotated among team members and the presenter is responsible for the content.

**The Project**

Our project centers around forecasting in real-time, stock prices on a short time interval (e.g., 1 minute). The components of the project are:

1. A Python-based method for retrieving price information on a short time interval
2. An algorithm for simulating price over time
3. One or more algorithms for forecasting prices
4. A Python function for plotting prices and forecasting prices
5. One or more decision rules for trading on the forecasts

We begin by forming two teams. Each team will create a summary of the tasks necessary to complete the project and build a simple price retrieval program. Each team will present their results Wednesday, January 23. Teams will reorganize Friday January 25.