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 $\approx$ 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.

Textbook: Algorithms for Data Science (ISBN-10: 3319457950) (online)

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. Oral presentations at the project end are expository and aimed at communicating methods and results.

Details

Our primary project centers about spatially explicit forecasting of disease rates (e.g., weekly influenza infection rates by state or county).