Course Syllabus
EM 622 - Welcome to Decision Making via Data Analysis

Instructor

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Course Review

This course provides an introduction to data visualization and data manipulation. The course is based mostly on the R statistical programming language, the techniques presented are general enough that can be used with other statistical/data analysis tools. The course covers basic visualization techniques and emphasizes the use of visuals to create compelling data stories. Additionally, students will get hands-on experience with basic data organization and manipulation techniques - in general how to understand a data set. Interactive and network visualization are briefly discussed.

No previous programming experience is required, although it is highly desirable. **IMPORTANT: This is not a coding course.**

The course should capacitate students to apply a framework for conducting data exploration analysis, manipulate data to fit their needs and create high quality plots to understand different phenomena.

Requirements

1. Access to a computer with Internet connection (we will be doing Active Learning)
2. Download and install R (http://streaming.stat.iastate.edu/CRAN/)
3. Download and install RStudio (http://www.rstudio.com/ide/download/desktop)

How To Make an “A” In This Class

The best way to make an “A” in any class is to study and practice. This class (and subject) is no exception. Showing up to class prepared is an excellent start; this means you should READ the slides and suggested material (recommended textbook, if possible) and work though the examples, homework and challenges after class.
The key factor to midterm and final project, which count 70% of final grade, is the coherence of presenting analytic results via a "data story" using visualization techniques that you learn from this class.

Tentative Course Schedule

Date	Topic	Challenge
Module 1 (January 23)	Introduction to Data Visualization	Web Based Data Story
Module 2 (January 30)	Presentations on Data Story Data Analytics	Data Story Cards Challenge
Module 3 (February 6)	Visual Perception and Data Manipulation	Minard Challenge
Module 4 (February 13)	Introduction to R Stats Review Visualization Universe	My First Graph Challenge Mini Challenges - 2-Week Challenge assigned
Module 5 (February 22)	Basic Graphs Polishing Graphs	Mid-Term Stop & Frisk Data Assignment
Module 6 (February 27)	Categorical Data	Presentations on 2-Week Mini-Challenges
Module 8 (March 6)	Midterm Challenge	Stop & Frisk
Module 9 (March 20)	Text Visualization & Analytics	Chernoff Faces Challenges
Module 10 (March 27)	Multivariate Data	
Module 11 (April 3rd)	Heatmaps Spatial Data Time Series	Mini Challenges
Module 12 (April 10th)	Project Studio Review 1	
Module 13 (April 17th)	Project Studio Review 2	
Module 14 (April 24th	Project Studio Review 3	
Final Class	Final Presentation of Project	Final Review and hand out final project by teams

Evaluation

The evaluation will be based on following criteria and weights:

- Discussions (5%): Participation.
- Two Week Project (25%): First group project
- Midterm Project (30%): Students will work in group with assigned project and deliver a "data story" presentation.
- Final Project (40%) : Students will work in group on their chosen project and create a poster and a "data story" presentation.

Textbooks

Textbook Reading is required:
Fundamentals of Data Visualization, Claus O. Wilke Available online at:
https://serialmentor.com/dataviz/

Students will be presented with slides, online tutorials and recent papers. In case students are interested, we recommend the following textbooks:

- ggplot2: Elegant Graphics for Data Analysis (Use R!) (http://www.amazon.com/dp/0387981403/ref=cm_sw_su_dp?tag=ggplot220)
- Fundamentals of Data Visualization by Claus O. Wilke: https://serialmentor.com/dataviz/
- The Art of R Programming: A Tour of Statistical Software Design (http://www.amazon.com/TheArt ProgrammingStatisticalSoftware/dp/1593273843)
- Visualize This: The FlowingData Guide to Design,
- VIsualization and Statistics (http://www.amazon.com/VisualizeThisFlowingData-VisualizationStatistics/dp/0470944889)