Fall 2023

DS 650-001: Data Visualization

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Data Visualization & Interpretation

Web and Software resources:

Course portal: canvas.njit.edu
Tableau:
https://www.tableau.com/academic/students

D3:
https://d3js.org/
https://square.github.io/intro-to-d3/

Python libraries:
http://seaborn.pydata.org/index.html
https://dash.plot.ly/?_ga=2.11438772.1202715669.1567783402-402630880.1564242752

Syllabus:

1. Introduction
    a. How visualization affects data interpretation
    b. Role of visualization in human-centered data science
    c. Two flavors of data visualization: exploratory and communicative

2. Visualization design principles I
    a. Data and task abstraction
    b. Best practices for encoding
    c. Marks and channels
    d. Tableau assignment
    e. Course project details

3. Visualization design principles II
    a. Effectiveness and expressiveness
    b. How to critique visualizations
    c. Design problems and consequences

4. Data Interpretability
    a. Causes of misinterpretation
    b. Role of communicative visualization in business and sciences

    c. Graphical interpretability: metrics and approaches.
    d. Tableau assignment

5. Exploratory Visualization techniques
    a. Handling high-dimensional data
    b. Comparison techniques
    c. Small multiples
    d. Handling uncertainty
    e. Depicting time

6. Interactive visualization
    a. Why interactivity is needed
    b. Handling multiple views
    c. Brushing and Linking
    d. D3 instructions and assignments

7. Visualization in data science: methods and examples
    a. Explaining machine learning models
    b. Interpretability challenges and solutions
    c. Transparency and human-machine trust
    d. Impactful case studies:
    biology, healthcare, cyber security, climate science, social science

How you can do well in the course:

In data visualization, the process is more important than the outcome, meaning that in an academic course, the focus is more on how you can reason about the need for and the effectiveness of visualization techniques, and less on whether you got the correct answer. Often, there is no single correct answer, but multiple viable solutions. As long as you are able to reason about your solution by applying the principles learnt in the class, you will be doing well in the course. This will need a combination of computational thinking as well as design thinking (putting the user first and thinking about the solution from a user's perspective). I hope you all will learn and develop these skills as part of this course, which will be the biggest take-aways and which you can apply in any real-life, data-driven problem-solving scenario.

Plagiarism and Academic Integrity

The approved “University Code on Academic Integrity” is currently in effect for all courses. Should a student fail a course due to a violation of academic integrity, they will be assigned the grade of “XF” rather than the “F” and this designation will remain permanently on their transcript.

All students are encouraged to look over the University Code on Academic Integrity and understand this document. Students are expected to uphold the integrity of this institution by reporting any violation of academic integrity to the Office of the Dean of Students. The identity of the student filing the report will be kept anonymous.

NJIT will continue to educate top tier students that are academically sound and are self-disciplined to uphold expected standards of professional integrity. Academic dishonesty will not be tolerated at this institution.