Data Visualization (DSC 530/CIS 602-02)

D3

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Nested Model of Design

- Domain situation
- Data/task abstraction
- Visual encoding/interaction idiom
- Algorithm

[Munzner, 2014]
Design Activity Framework

Understand
design requirements

Ideate
ideas

Make
prototypes

Deploy
visualization system

[S. McKenna et al., 2014]
Five Sheets Design

Sheet 1
Ideas
Filter
Categorize
Combine & Refine
Question

Sheet 2,3,4
Layout
Information
Operations
Discussion

Sheet 5
Layout
Information
Operations
Focus / Parti
Detail

Ideation
Alternative Designs
Realization

[J. Roberts et al., 2016]
D3.js is a JavaScript library for manipulating documents based on data. D3 helps you bring data to life using HTML, SVG, and CSS. D3’s emphasis on web standards gives you the full capabilities of modern browsers without tying yourself to a proprietary framework, combining powerful visualization components and a data-driven approach to DOM manipulation.

See more examples.
Data-Driven Documents (D3)

- JavaScript Library
- http://d3js.org/
- Original Authors: Mike Bostock, Vadim Ogievestky, and Jeff Heer
- Open Source
- Focus on Web standards, customization, and usability
- Grew from work on Protovis: more standard, more interactive
- By nature, a low-level library; you have control over all elements and styles if you wish
- A top project on GitHub (over 60,000 stars as of 2/8/2017)
- Lots of impressive examples
  - Bostock was a New York Times Graphics Editor
  - http://bost.ocks.org/mike/
D3 Key Features

- Supports data as a core piece of Web elements
  - Loading data
  - Dealing with changing data (joins, enter/update/exit)
  - **Correspondence** between data and DOM elements

- Selections (similar to CSS) that allow greater manipulation

- Method Chaining

- Integrated layout algorithms, axes calculations, etc.

- Focus on interaction support
  - Straightforward support for transitions
  - Event handling support for user-initiated changes
D3 Introduction

• Ogievetsky has put together a nice set of interactive examples that show off the major features of D3
• http://dakoop.github.io/IntroD3/
  - (Updated from original for D3 v4)
• Other references:
  - Murrary’s book on Interactive Data Visualization for the Web
  - The D3 website: d3js.org
  - Ros’s Slides on v4: https://iros.github.io/d3-v4-whats-new/
D3 Data Joins

- Two groups: data and visual elements
- Three parts of the join between them: enter, update, and exit
- enter: $s$.enter(), update: $s$, exit: $s$.exit()