

Advanced Data Visualization

CS 6965

Fall 2019

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University of Utah



Project 03



Visualizing Multi-Layer Networks

Objective

- Create a visualization prototype of 2-layer infrastructure network using D3.js
- The networks consists of interdependent transportation network/system and power network/system
- Clients: domain scientists (Alex and Avi from Dr. Parvania's group) who work on infrastructure networks and smart city design
- The following is a grading guideline, not a design pipeline

A note on D3.js

- If you have questions regarding D3.js, please email the instructor
- A good starting point to learn D3.js is at:

<https://alignedleft.com/work/d3-book-2e>

- There are many resources online for visualizing networks using D3.js, such as

<https://www.d3-graph-gallery.com/network.html>

<http://bl.ocks.org/jose187/4733747>

- Another good starting point to google D3.js network visualization

Basic Project Development:
Visualizing the 2-layer network at a
single fixed time point

Data

- Data are provided as TransitSystem.xlsx and PowerSystem.xlsx, together with a ReadMe.pdf
- ReadMe.pdf also describes the connectivity of each network
- Please obtain the data and the original presentation from Canvas:
[Project3-Data.zip](#)
- [Active research project, please do not distribute data without written permission from the domain scientists](#)

Visualizing power system network (5 points)

Create a visualization of power network that consists of:

- (3 points) A visualization of the topology of network following user-specified layout in ReadMe.pdf (nodes, edges, etc.); variation of the layout is permitted as long as the connectivity between nodes remains the same.
- (1 point) Use visual encoding (color, shape, glyphs, charts, or interaction such as mouse over etc.) to visualize 3 features for each node
- (1 point) Use visual encoding to visualize at least 3 features for each link

Visualizing transportation system network (8 points)

Create a visualization of transportation network that consists of:

- (3 points) A visualization of the topology of network following user-specified layout in ReadMe.pdf (nodes, edges, etc.); again, abstract layout is permitted (even preferred) as long as connectivity is not altered
- (3 point) Use visual encoding (shape, color, glyphs) to visualize locations of all BEB (Battery-Electric Buses) at the given time
- (2 point) Visualize BEBenergy and BEBpower profile of each BEB

Interdependency (2 points)

Create a visualization of transportation network that consists of:

- (2 points) Visualize interconnectivity between the 2 networks (e.g., visualize the interdependent links)

Bonus Points:
Time-Varying and Interaction

Time-varying component (5 points)

Create a time-varying visualization of the 2-lay network where the visualization varies based on a ``control bar”

Enhanced interactive visualization (5 points)

Add additional interactions to the visualization to enrich users' ability to explore the 2-layer network; such as build-in alert, highlight, rotation, layout modification, mouse-based clicking, zooming, selection, drop-down menus, etc.

Advanced, creative visualization components (5 points)

Any creative visualization components, such as Data Analysis or Machine Learning capabilities. The sky is the limit.

CREDITS

Special thanks to all people who made and share these awesome resources for free:

- ☐ Presentation template designed by [Slidesmash](#)
- ☐ Photographs by [unsplash.com](#) and [pexels.com](#)
- ☐ Vector Icons by [Matthew Skiles](#)

Presentation Design

This presentation uses the following typographies and colors:

Free Fonts used:

<http://www.1001fonts.com/oswald-font.html>

<https://www.fontsquirrel.com/fonts/open-sans>

Colors used

