CS4460 / **Spring23-Labs-PUBLIC** Public

Code Issues Pull requests Actions Projects **Wiki** Security Insights

Lab 7 A: Force Directed Graph

Jump to bottom

Alex Endert edited this page 16 days ago · 3 revisions

Force Directed Graph Visualization

Lab7 Description

This final programming assignment of the term is a more open-ended data visualization challenge. We have created a series of design specification for you to implement against (Lab 7 A,B,C,D). *You only need to complete one of these.* Take some time to look through each of them and decide.

Note that there is no starter code for this lab. You are welcome to use code from your previous assignments, or start from scratch. Some descriptions include resources or tips that may help you get started.

What to submit

1. You should implement the design specification below, including the visual interface and user interaction components.
2. Rename your `lab7` folder to `LastName_FirstName_lab7`
3. Zip up `LastName_FirstName_lab7` as `LastName_FirstName_lab7.zip` and submit it to Canvas.

Grading

Each lab7 submission will be graded against the design specification provided for the lab that you choose. This will consists of:

1. Correctly implementing the visual design elements of the lab. This includes: correct syling of the chart (or charts) used, correct data mappings between the data and the views, and use of axis labels and styling where applicable.
2. Correctly implementing the interactive functionality. This is specified through the design specification, and also the short video for each lab7 option that highlights how it should work. Both of these components are important. Depending on which lab7 you choose, these may be independent (e.g., filters), or very connected (e.g., scrollytelling).

Grading Notes specific for lab 7A

In addition to the user interaction and interface elements described below (and in the video), this lab places particular emphasis on the graph layout. Also, the search and selection interactions are core to the functionality of this vis.

Which TAs to ask for help on this lab

To make feedback, guidance, and grading more consistent for lab7, we have assigned the following TAs as the primary people to ask for assistance on this lab:

- Aishwarya

Design Specification

The goal of this visualization is to visualize a dataset about movies in an interactive graph visualization.

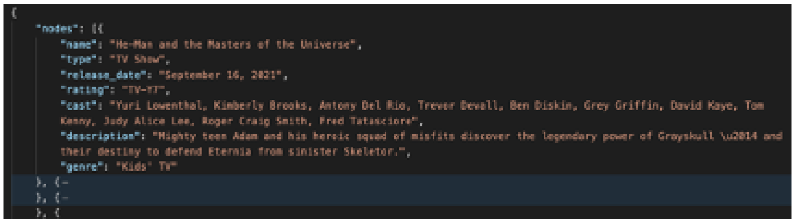
See the video clip below of a demo of the visual and interactive aspects of this lab: Video

Dataset

For this visualization, please use this dataset: Data

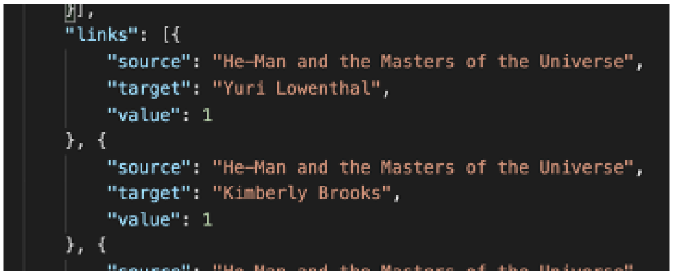
The data consists of a JSON object that consists of two properties:

1. “nodes”: This is an array of elements each representing an entity (TV Sow / Cast) and is a JavaScript object with different properties such as “name”, “type”, etc. (Note: the properties for a TV Show will be different than those for Cast) E.g., interpretation from below screenshot, “He-Man and the Masters of the Universe” is a “TV Show” released on “September 16, 2021” with a rating of “TV-Y7” under the “Kids’ TV” genre. It’s “description” (plot) and “cast” members are also mentioned.



```
{
    "nodes": [{
        "name": "He-Man and the Masters of the Universe",
        "type": "TV Show",
        "release_date": "September 16, 2021",
        "rating": "TV-Y7",
        "cast": "Yuri Lowenthal, Kimberly Brooks, Antony Del Rio, Trevor Devall, Ben Diskin, Grey Griffin, David Kaye, Tom
        Kenny, Judy Alice Lee, Roger Craig Smith, Fred Tatasciore",
        "description": "Mighty teen Adam and his heroic squad of misfits discover the legendary power of Grayskull \u2014 and
        their destiny to defend Eternia from sinister Skeletor.",
        "genre": "Kids' TV"
    }, {…
    }, {…
    }, {
```

2. “links”: This is an array of element each representing an “acted-in” relation between TV Show and Cast and is a JavaScript object with three properties: “source”, “target”, “value”. “source” and “target” correspond to the “name” property in each of the “nodes” object above. “value” signifies that a relation exists, and is always equal to 1. E.g., interpretation from below screenshot, “Yuri Lowenthal” acted in “He-Man and the Masters of the Universe”. “Kimberly Brooks” also acted in the same movie.



```
    }],
    "links": [{
        "source": "He-Man and the Masters of the Universe",
        "target": "Yuri Lowenthal",
        "value": 1
    }, {
        "source": "He-Man and the Masters of the Universe",
        "target": "Kimberly Brooks",
        "value": 1
    }, {
        "source": "He-Man and the Masters of the Universe",
```

User Interface Elements

The design of your visualization needs to include the following elements. See the demo video for additional views.

1. Title
2. Legend (blue, green circles and the gray line with corresponding text labels)
3. Search Input Field
    i. The demonstration is using the HTML element (https://developer.mozilla.org/en-US/docs/Web/HTML/Element/datalist); feel free to use alternatives, including external libraries
4. Detail Info Card
    i. Shows detailed information of the hovered/searched entity (TV Show / Cast member)
5. Visualization (force directed graph visualization)
    i. Force-directed graph drawing algorithms are a class of algorithms for drawing graphs in an aesthetically-pleasing way. Their purpose is to position the nodes of a graph in two-dimensional or three-dimensional space so that all the links/edges are of more or less equal length and there are as few crossing links/edges as possible, by assigning forces among the set of links/edges and the set of nodes, based on their relative positions, and then using these forces either to simulate the motion of the links/edges and nodes or to minimize their energy [Wikipedia].
    ii. We can create force-directed graph visualizations using D3!!! Checkout the below examples to see them in action / get started
        a. https://observablehq.com/@d3/force-directed-graph
        b. https://bl.ocks.org/mbostock/4062045 (note: this uses D3 v4 and some API may be different from v6 which is what we've been using for the labs)
    iii. And then refer to the documentation at https://github.com/d3/d3-force for an in-depth understanding of the different types of inter-node and inter-link forces that can be simulated.

User Interaction

Your visualization needs to have the following user interaction functionality (again, see the video demo for how these should appear and function).

1. Hovering over (mouseover) a circle (TV Show / Actor)
    i. Brings the highlighted node into focus along with a text label showing the TV Show / Cast name (depending on what was hovered)
    ii. Also brings the immediate neighbor (connected) nodes into focus.
    iii. Displays the corresponding Detail Info Card.
2. Hovering out (mouseout) from a circle retains this configuration until #1 happens on a different node OR #2 or #3 happen.
3. Searching via the Search Input Field:
    i. Should have *both* TV shows and actors by default.
    ii. As you type, it should filter based on your search query and upon selection, you should mimic what hovering the corresponding node (circle) in the visualization does (as described in #1

above).

4. Clicking anywhere on the SVG outside the nodes and links (in the white-space areas) hides the Detail Info Card and defocuses the hovered node.

Notes and Tips

- A force-directed graph is indeterministic in nature, i.e., every time it is loaded in the browser (even across refreshes), it does not guarantee the same positions of nodes and links. Thus, there is no need for your visualization "layout" to look exactly as the one shown in the demonstration. Specifically, the inter-node {forces, charges, gravities} and inter-link {strengths, distances} will be different for each user. We will grade it keeping this point in mind. However, you cannot randomly / manually position the nodes and edges; they must be positioned through a force-directed graph implementation.

- An actor/actress (“cast”) can act in one or more TV Shows (so there may be “cast” nodes with more than one edge); and, a TV Show can obviously have 0 or more “cast” nodes (yes, there may be 0s too – this could be due to the dataset’s data collection practice?).

- The actual sizes, colors of the nodes / thickness of the lines / font sizes in the Detail Info Card need not exactly match the demonstration. Try to match them as much as possible while ensuring it is aesthetic.

- Try to use D3 v6 (might be easier since other labs used it); but feel free to other D3 versions if you are comfortable.

▾ Pages 11

Find a page…

▸ Home

▸ Lab 1: Intro to HTML, CSS, and SVG

▸ Lab 2: Javascript 101

▸ Lab 3: Intro to D3

▸ Lab 4: D3 Selections and Grouping

▸ Lab 5: D3 Enter, Update, Exit, and Filter

▸ Lab 6: Brushing and Linking

▾ Lab 7 A: Force Directed Graph

Force Directed Graph Visualization

Lab7 Desciption

What to submit

Grading

Clone this wiki locally

```
https://github.gatech.edu/CS4460/Spring23-Labs-PUBLIC.wiki.git
```