Lab02:
Interactive Data Visualizations with D3js

junning.deng@ugent.be (Lemon)

(Exercise orignally developed by Dieter De Witte, Bo Kang)

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Setting up the lab environment

This lab session requires a web browser (Chrome), an http server and a text editor to write your code[1]. Let's have a look at the local installation:

Setting up http server:

1. Download the starter code from Ufora and unzip the data in a local directory of choice
2. In this local directory, start a minimal http server:
   python -m http.server 8888
3. To terminate the server you can use Ctrl-C, for the next exercises repeat these steps in the command shell but in other directories.

Getting to the javascript console

1. Open your (Chrome) browser at `http://localhost:8888`
2. If there is an index.html file in the directory where you started the http server, this page will no be shown in your browser.
3. Starts the javascript console (e.g., Ctrl+Shift+J or Cmd+Alt+J)

Next you can experiment in the javascript console (use tab for code completion) and use a text editor to modify the html file.

[1] Alternatively you can use a new javascript notebook approach called Observable: `https://beta.observablehq.com/`, although that might come with a small learning curve.

The starter code for each of the exercises can be found in

2019Lab2_FILL_IN/EX1/
2019Lab2_FILL_IN/EX2/
2019Lab2_FILL_IN/EX3/

The idea of the exercises is you edit this code to reproduce the visualizations given in these instructions.

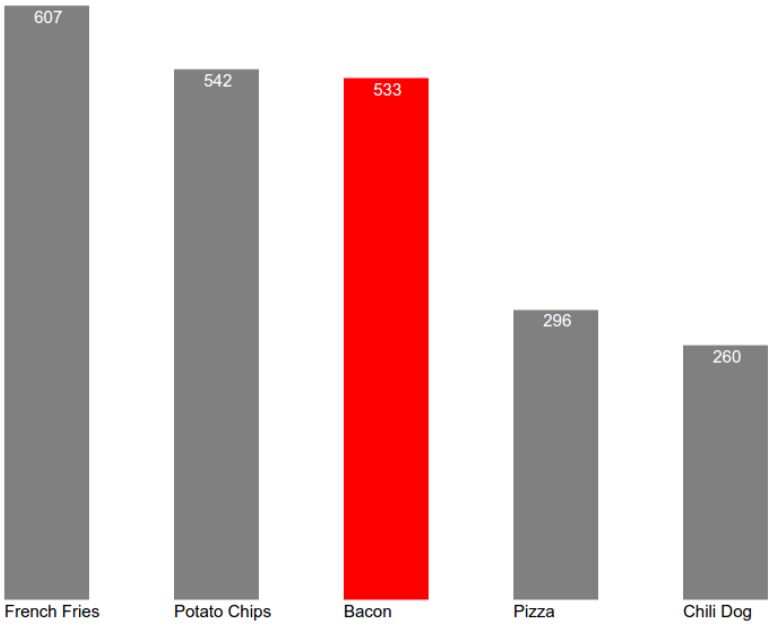
Some relevant information on how to use D3 is given in

Filename: `d3v4.pptx`

Exercise 1: Tufte's bar chart

Let us recreate Tufte's bar chart from the theory lesson:

Figure 1: Tufte's Bar Chart



You can approach this as follows:

1. Create a dataset, as an array of tuples (containing name of the food and the number of calories)
2. Create scales: an ordinal scale for the X-axis, a linear scale for the Y-axis
3. Use the .data() function to join a set of `<rect>` elements with the dataset
4. Add the exact number of calories to the top of the bars
5. Add interaction: hovering over a bar changes its color from grey to red (and back!).

All things are difficult before they are easy. Checking this interactive bar chart tutorial given by Kevin Kononenko [2] and the one given by Vegibit can be very useful [3]. D3's official home on the Web is `d3js.org`. The API, many tutorials and examples can be found there. Good luck!

Exercise 2: Pre-attentive applet

Let us try and rebuild this applet which we saw during the lecture:
`https://www.csc2.ncsu.edu/faculty/healey/PP`

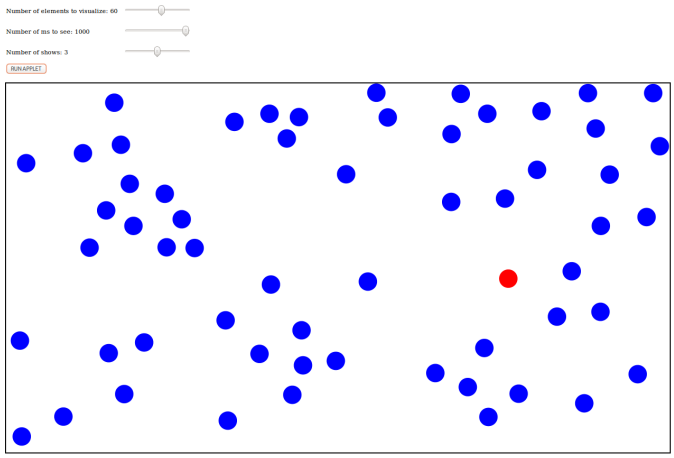


Figure 2: Example of how your pre-attentive applet may look.

[2] https://www.codeanalogies.com/d3garden/
[3] https://vegibit.com/create-a-bar-chart-with-d3-javascript/

1. Write a function that generates a set of noncolliding points with a fixed radius in a bouding box

2. Given an array of noncolliding points, join this data array with svg circles

3. Use javascripts setTimeOut() and setInterval() functions to show the visualization only for a number of seconds

4. Make the visualization configurable from the browser (you can use text fields and a submit button): allow configuration of number of dots, the number of ms they are visible and the number of times the visualization repeats.

Exercise 3: Matrix visualization of movie rating data

For this exercise, the two datasets *moviesIMDB.tsv* and *movieSurvey.tsv* are given. *moviesIMDB.tsv* include the attributes: MovieID, Title, Tags, ImdbScore, while the columns in *movieSurvey.tsv* respectively represent: MovieID, Evaluator name, Seen (boolean), Score.

1. Design a matrix plot with the rows = users(evaluators), columns = movies. For the ratings use colorbrewer[4] to select an appropriate colorscheme corresponding to the rating that the movie receives. Consider what to do with movies that have no rating.

2. Upon hovering over a square show the name of the corresponding user and the movie title in the left upper corner.

[4] http://colorbrewer2.org

Figure 3: Matrix visualization showing overall rating behaviour