CS 171

Homework 2

In this assignment, you'll use HTML, CSS and JavaScript to create a small dashboard for a local pizza delivery company. It should help the company to get meaningful insights into their collected data and to evaluate their performance. We provide a small framework, based on *Bootstrap*, and two example datasets.

In the design part of this homework you have to critique a visualization (you can choose between two given examples) and you have to create a few sketches, similar to our previous lecture.

This homework assumes that you have read and programmed along with chapter 3 (up to page 53) in *D3 - Interactive Data Visualization for the Web* (Second Edition) by Scott Murray.

1. Complete lab 2 (counts for particpation)

Please put all completed files from Lab 2 in the `lab` directory of your submission and submit it with the rest of this homework.

2. PizzaWorld - Insights & Statistics (2.5 points)

Framework

We are providing a small template (based on *Bootstrap*) for this homework. It is quite similar to the framework which we have used in our second lab and should help you to get started. You can download the framework for homework 2 here.

You will need to extend the following files:

- `index.html`
- `css/style.css`
- `js/main.js`

Data

We have included two datasets from *PizzaWorld* in the framework. One table has 1198 rows with pizza deliveries and the other table has 200 rows with corresponding customer feedback.

The data (arrays with JSON objects) are already stored in these two global variables:

- `deliveryData`
- `feedbackData`

The variables are accesible in the JS file `main.js`

To get started, write the variables to the web console and inspect them.

Delivery Data

- `delivery_id`
- `date`
- `area` (Boston | Cambridge | Somerville)
- `price` (in USD)
- `count` (number of delivered pizzas)
- `driver`
- `delivery_time` (minutes)
- `temperature`

- `drinks_ordered` (true | false)
- `order_type` (web | phone)

Feedback Data

- `delivery_id` (matches the deliveries)
- `punctuality` (medium | low | high)
- `quality` (medium | low | high)
- `wrong_pizza` (true | false)

Implementation

1. **Download framework**

   If you haven't done so already, please download the framework for homework 2.

2. **Display dataset summary**

   Extract the following numbers from the provided data and append them with meaningful labels to the HTML document (part 2 in function *createVisualization()*):

   - Number of pizza deliveries
   - Number of all delivered pizzas (*count*)
   - Average delivery time
   - Total sales in USD
   - Number of all feedback entries
   - Number of feedback entries per quality category: *low*, *medium*, *high*

   → You should update the DOM dynamically with JavaScript!

   Feel free to use plain JavaScript methods or the library jQuery to update the content. The JS framework jQuery is already included because it is required for Bootstrap. You can learn more about jQuery on these websites: jquery.com or w3schools.com/jquery/.

   > Make sure you test your code after you have implemented this part! Once your code is working, consider your code structure and code design:
   >
   > a) If your code is already longer than a couple of lines, extract it into a separate function and call that function within *createVisualization()*.
   >
   > b) Think about calculating the above numbers at the same time (e.g., inside a single loop), if possible. That will make the code shorter and easier to read, as well as faster.

> c) Make sure you use consistent spacing, layout, self-explanatory variable names, and code comments! If you do this as you progress in your coding project, this will save you a lot of time later!

3. **Call the function: *renderBarChart(deliveryData)***

   If you call *renderBarChart()* our script will automatically group (and count) the deliveries per day. Subsequently a bar chart will be added to the container: `#chart-area`.

   Requirements:

   - You need a div-container with the id `#chart-area` in your HTML document
   - As a **function parameter**, you have to include a JSON array with deliveries (each delivery is an object and must include at least the property: `date`). Try to call *renderBarChart()* (inside `createVisualization`) with the variable `deliveryData`.

   → You should now see a basic bar chart in your webpage.

4. **Filter the data before drawing the bar chart**

   In the next task, you should filter the `deliveryData` array depending on the selected options, before calling *renderBarChart()*.

   a. Add two **select-boxes** to your HTML document. The user should be able to select:

   - `area` (*All*, *Boston*, *Cambridge* or *Somerville*)
   - `order type` (*All*, *Web* or *Phone*).

   Make sure to set the callback function of the select boxes to the function that updates and creates our visualization!

   b. If the user selects an option, filter the variable `deliveryData` accordingly and then call *renderBarChart()* again. Every time you call this function, it will analyze all changes in your array and update the chart with D3.

   > It is good practice to do a sanity check on the result you get after filtering or processing data. Take a look at the original data, do the numbers make sense? Are there missing values? This is especially important when dealing with real-world data that has not been cleaned and prepared for easy use in a homework ;-)

5. **Global data filtering**

   In the previous step you have implemented a function which reacts to the user input (change of a select-box value) and updates the chart immediately.

Additionally, these filter options should also affect the displayed dataset summary that you implemented earlier.

→ If the user filters the data by a specific `area` or `order type` you should **update the bar chart and the display of the summary data** from step (2).

Hint: The data are stored in two separate variables. Make sure your filtering algorithm influences customer feedback as well as order data.

6. **Style your webpage using CSS.**

   We already provided a simple css file in our template. Adjust either the CSS or the html elements you dynamically generate to create a visually pleasing and easy to read webpage.

3. Design Analysis / Critique (1 point)

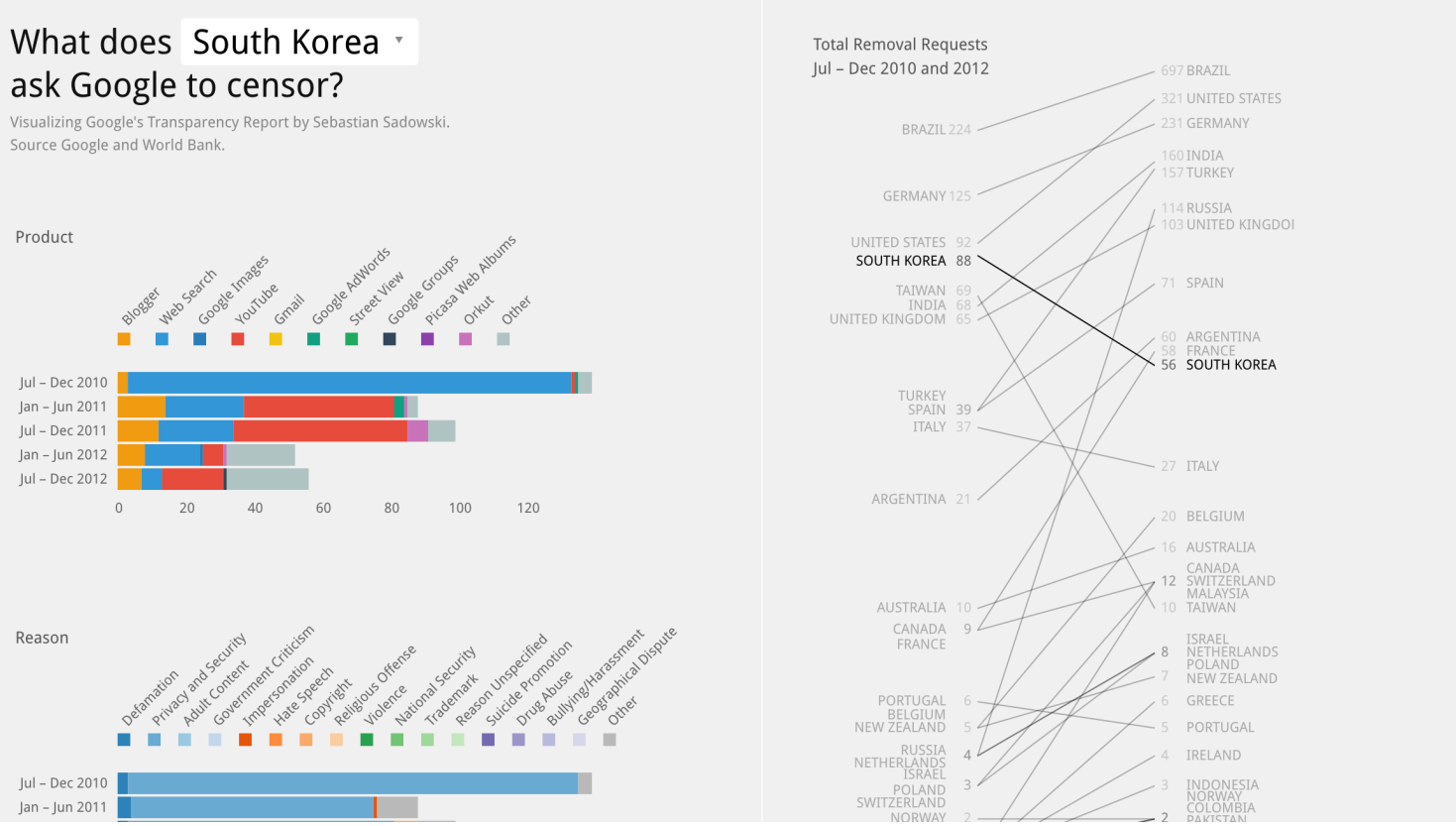
- Choose **ONE** of the visualizations (*A* or *B*)
- Evaluate the visualization based on lie factor, data-ink ratio and graphical integrity
- Answer the following questions:

  1. Who is the audience?
  2. What questions does this visualization answer?
  3. What design principles best describe why it is good / bad?
  4. Why do you like / dislike this visualization?
  5. How could the data-ink ratio be improved? And can you suggest any other improvements?

Please do not use more than 400 words (cumulative) to evaluate the visualization and answer all questions. You will have to submit your design critique as a PDF document (critique.pdf).

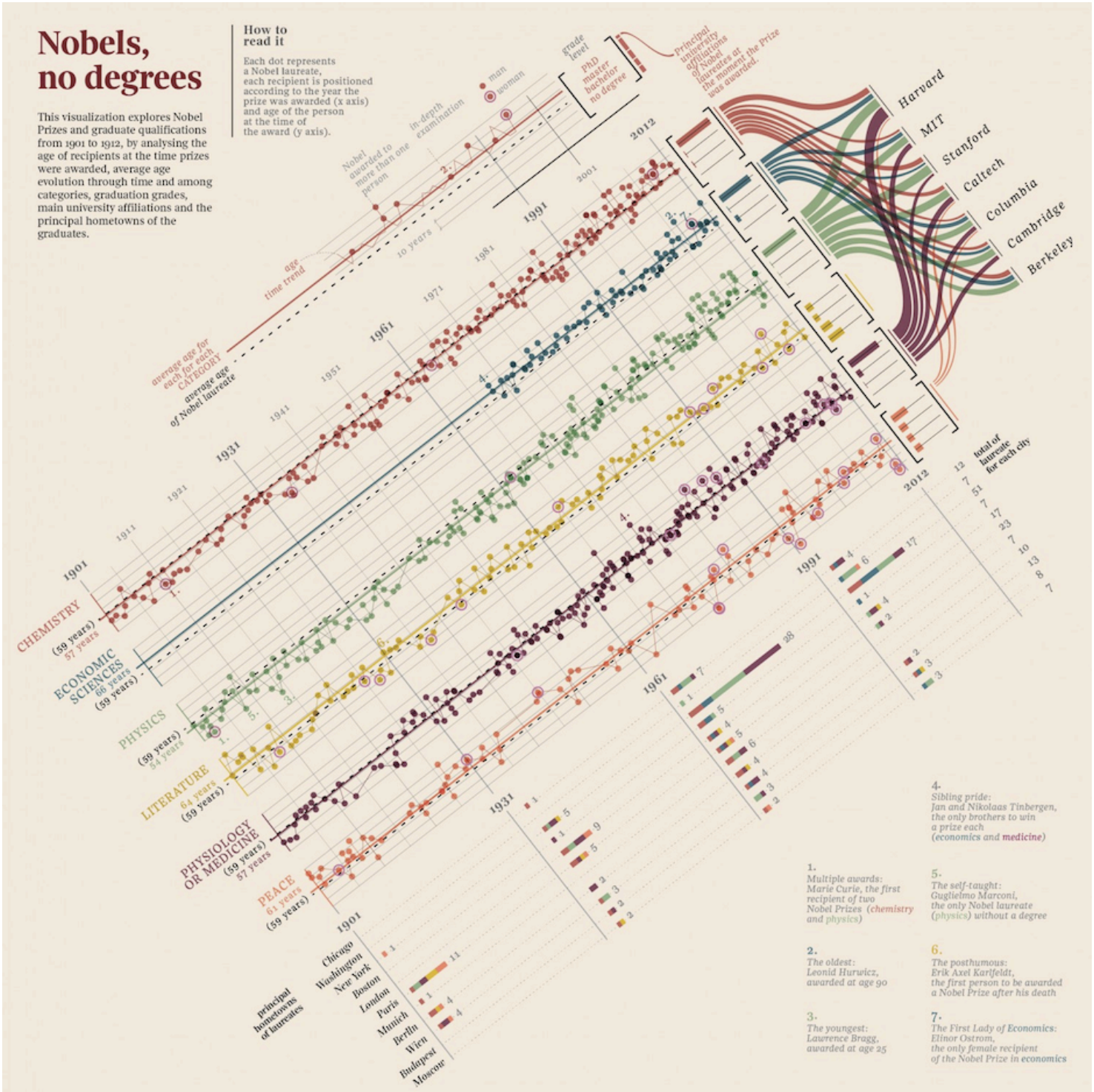
Visualization A

http://transparencyreport.ahoi.in/



Visualization B

http://visual.ly/nobels-no-degrees-english



4. Design Creation (0.5 points)

Create 5 sketches to visualize the following data and name the visual dimensions you are using to encode the information:

A:	12	23
B:	32	17

Scan your sketches and create a PDF (creation.pdf) with all results.

5. Bonus Task (0.5 points)

Please make sure to finish all the previous tasks before you start with the bonus activity. Extra credit is only given if the rest of the homework has been completed. This task is intended for those of you who already have more experience with HTML, CSS and JS.

You are currently showing overall statistics and a bar chart on your website. Whenever the user changes a selection, the corresponding dataset will be filtered and the views are getting updated. In this bonus task you should extend the dashboard with a sortable table view to show the individual customer feedbacks.

Column names:

- Delivery ID
- Area
- Time [min]
- Driver
- Number of pizzas
- Punctuality
- Quality
- Wrong Pizza

You should also connect the table with the select-boxes and your update mechanism. If the user selects *Boston* and *Phone*, the rows should be filtered accordingly.

You can use the same script as in HW1 to make your table sortable:
http://www.cs171.org/2017/assets/scripts/hw1/sorttable.js *(Hint: use the class name 'sortable')*

6. Submit Homework in Canvas

a. Upload your JS homework under 'submission/hw/implementation'.

b. Upload 2 PDF files (design critique and design creation) under 'submission/hw/design'

c. Upload the completed lab under 'submission/lab'

Use the following recommended folder structure:

```
/submission
    hw/
        implementation/
            index.html
            css/        ...folder with all CSS files
            js/         ...folder with all JavaScript files
        design/
            critique.pdf
            creation.pdf
    lab/
        ...
```

Upload the submission.zip file.