CSC5008Z
Multidimensional Data Visualization Course Assignment
February-April 2018

Aim
The purpose of this assignment is to give you experience in applying the principles of visual thinking and design, as outlined in the course lectures, to a particular visualization problem.

A good project will comprise a clear design for an interactive visualization that shows both good understanding of visual principles and evidence of exploration and iteration in the design process.

I do **NOT** expecting user testing and evaluation: those topics are covered in Human Computer Interaction courses.

Ideally, I would like your efforts to be innovative, but please note that I do not expect your designs to be perfect. Also, do not reinvent the wheel. If a good solution already exists, use it. I **do** expect that you do a good review of the literature. You must also reflect on the problems with your design and report your analysis clearly. A less than perfect design will not necessarily mean poor marks, but failure to comment on the failings and explain your reasoning will!

Mark Allocation
This assignment accounts for 50% of the assessment mark in this course. The examination accounts for the remaining 50%.

Deliverables/Design stages

Groups
You must form a group of two or three (not more or less) in order to do the assignment. All members of the group are expected to contribute equally to the design.

Dataset

Your group must identify a suitable multidimensional dataset and have it approved by the course convenor (me). This data set should ideally be something you are interested in and understand. All data sets must be discussed and cleared with me: I have allocated a lecture on the 1st March for this.

Task abstraction and Visual Queries

You must outline the task goal of your visualization and then identify the primary tasks that users will perform with your visualization. This will determine the appropriate and necessary visual queries that your project should (and will) support. The primary visual queries must be listed (at least 5) and ranked in order of importance.

Literature review

You need to review and analyze at least 3 different visualizations (one per group member) that have been applied to data sets similar to yours.

Design process

For the design, remember to follow the discussed in class – e.g. no unnecessary 3D, Schneiderman's mantra. Do not over-rely on user interaction (mouse clicks) for your basic visualization. And remember, pie charts cannot be justified. Don't use them, in any form. Think about using effective symbols and shapes and don't forget about depth and texture.

For the first presentation, you must generate **three** alternative designs (one per group member) for the visualization of your data set. The idea is to explore the "solution space" to enable you to generate ideas for a good final design. Designs must be significantly different from each other.

I am not giving you explicit instructions on how to do the prototypes: the idea is to be able to present and explain your complete idea. There are many possible ways of doing this ranging from paper sketches, through digital mock-ups to more complete prototypes, likely with some form of implementation in code. You need to simply illustrate the interface functionality. The D3.js JavaScript library is likely to be useful, as is Matplotlib

(http://matplotlib.org) for graphing. However, paper prototypes can be very effective.

The first presentation of your design will be 10 minutes long, with 10 minutes of subsequent question and critique. In this, you should outline the task abstraction, the visual queries, **the literature review**, explain your three alternative designs (including how the interaction works) and then select a final design, with justification.

The final presentations will be 10 minutes, followed by 10-15 minutes of question time. In this, you should explain and justify the your final design, including the improvements made as a response to criticism in the first presentation. Your desing should be presented with some actual data visualized (not invented data). You should clearly outline the strengths and weakness of your final design in terms of the visual principles covered in the course.

Report

You are required to write a concise **webpage report** describing the work done, with sufficient illustration: graphs, tables and/or figures. Your design should be clearly presented, and discussed. It is important to highlight the difficulties/disadvantages as well as the advantages. The report must be submitted as a zipped archive and should itself use an effective design for displaying your work.
NOTE: the report must be a *standalone webpage archive* with all the links local and operational.
Late submissions will be penalized by 10% per day (or part thereof)

Evaluation (marking guide)

I will assess both the report and your presentations. I expect your report to include:

- An introduction, containing a **description of the data set** and a profile of the type of user your visualization is aimed at.
- An analysis of the task abstraction and **visual queries** your system aims to support, ranked in order of importance.
- An overview and analysis of **related work**, including (of course) references in a consistent style.

- A detailed description of your design, including initial sketches and screenshots of your implementation. You must include **justifications** or **rationalizations** of your design decisions **in terms of the visual thinking principles** presented in the course.
- You will need to clearly explain the interactive aspects of your design.
  Marks will be also be assigned for implementing (and reporting on) changes suggested first prototype evaluation in class.
- A critical discussion of both the **strengths and weaknesses** of your design implementation. This section should detail any difficulties you encountered and how you dealt (or could not deal) with them.
- **Conclusions and future work**. This section should also deal with any issues raised during the second presentation of your work to the class.
- A comment on who did what – i.e. how your group split up the work (and a comment on how efficient this was)

Overall, I will be asking the following questions:

- Is the visualization effective?
- Does visualization support different visual queries about the data?
- Does it support important visual queries?
- Is your approach creative and does it illustrate new ideas?
- How much did you experiment with alternative designs?
- Is your report a true representation of the work done?
- Does your report show evidence of critical thinking, analysis, insight and work?
- Does your write-up help someone understand the problem and how your system addresses that problem?
- Did you respond and react to critiques of your work effectively and comprehensively?