FIT3179 DATA VISUALISATION

Semester 2, 2018

Data Visualisation Project Assignment

In this multi-part assignment, you will design and build an effective data visualisation. This will require you to critically evaluate information and visualisations in a domain of your choice and develop your own visualisation using the *Tableau* software.

The aim of the assignment is to apply the data visualisation techniques examined over the course of the semester, and demonstrate their use in an innovative context. As such, the visualisation should satisfy the following:

- Why: It should address a particular need within a specific domain of your choosing. It must be targeted to the domain, its needs, and its users. This does not mean the visualisation has to solve a problem as such, but it must be a visualisation that is useful to people within the chosen domain.
- What: It should use a data source relevant to the domain. The data source does not have to come from within the domain, however the data itself must obviously be relevant. Data can be of any kind.
- It should turn data/information into something meaningful and provide insight that would otherwise be difficult without the visualisation.
- It must provide interactive exploration.
- It needs to show some innovation. It does not have to be wholly original, but CANNOT simply be a replica of a visualisation that already exists in the domain. It could be an innovative visualisation, or the use of a known visualisation with a new kind of data.
- It should demonstrate use of the Five Design Sheet methodology for sketching and planning the design of your visualisation.
- It should demonstrate use of the Munzer What/Why/How framework discussed in lectures for correctly assessing the type of data, the goals of the visualisation and the design of the visualisation, respectively.
- It must apply design principles discussed throughout the unit, such as data-ink ratio, storytelling, layout, appropriate use of channels, and use of advanced visualisation idioms.

Learning outcomes

This assessment is related to these learning objectives:

1. critically analyse data visualisations;
2. create effective data visualisations;
4. describe the advantages, drawbacks and pitfalls of the visual presentation of data as compared to its presentation using other media.

Assignment Parts

The assignment has 5 main parts.

1. **Choose the domain:** In week 5 you will bring to class a short description of the proposed application domain and questions that your visualisation will be designed to answer. It should also indicate where you intend to obtain data for the visualisation. Your tutor will discuss this with you in class. You MUST receive approval from the tutor for the choice of application domain and questions before proceeding with the rest of the assignment.

2. **Critical Review/Presentation of proposal:** In week 6 of class you will give a 5-minute presentation to the class on existing visualisations for your chosen domain/question and related domains/questions. You should critically review these visualisations, making use of the concepts taught in this unit. You will also briefly describe the visualisation that you intent do build.

3. **Visualisation: Design and Implementation:** You will design and build an information visualisation for the domain that you think is better than current approaches, using Tableau. The implementation should satisfy the elements listed in the section (*'Tasks'*) above. You will submit the visualisation in week 12, but you need to have it complete for the week 11 presentation (see below). If you wish to develop your interactive visualisation system using technology other than Tableau (e.g., HTML5 or D3) you may do so but you must seek permission from your tutor first.

4. **Presentation of solution:** In week 11 you will give a 5-minute presentation to the lab class that demonstrates your visualisation and describes the design decisions you have made and the reasons for them.

5. **Report:** At the end of week 12 you will submit a concise written report of no more than 1500 words (based on your presentations and feedback for them) that contains:
   a. Problem description and motivation
   b. Critical review of related visualisations
   c. Descriptions of design process and the final visualisation design including reasons for your choices
   d. Appropriate references and bibliography

General Marking Criteria

1. **Choose the Domain (week 5):** Not assessed, but this is a hurdle that must be completed before beginning your project.
2. **Critical Review/Presentation of Proposal (week 6)**
   a. Comprehensiveness and quality of critical review of related visualisations
   b. Logical structure and quality of presentation
3. **Visualisation: Design and Implementation (week 12)**
   a. Effective use of data visualisation principles to design the visualisation
   b. Correctness and quality of visualisation
4. **Presentation of Solution (week 11)**
   a. Effective description of data visualisation principles used in your project
   b. Correctness and quality of your implementation
   c. Quality of oral presentation
5. **Report (week 12)**
   a. Comprehensiveness and quality of the critical review of the problem, related visualisations and the visualisation created
   b. Quality of written report
   c. Explicit use of the Five Design Sheet framework and three distinct sections titled (each) What, Why and How following the Munzer What/Why/How framework, and other design principles discussed in lectures.

Detailed marking rubrics are provided for (1) the Critical Review/Presentation of Proposal, (2) the Visualisation, (3) the Report and (4) the Critical Review/Presentation of Proposal on the following pages.

Value

1. **Choose the domain:** 0%, but this is a hurdle that must be completed before beginning your project.
2. **Critical Review/Presentation of Proposal:** 5%
3. **Visualisation: Design and Implementation:** 20%
4. **Presentation of Solution:** 5%
5. **Report:** 20%

Instructions for Critical Review/Presentation of Proposal (Week 6)

You will need to find and critically review visualisations with a specific reference to the concepts taught in this unit. We expect you will show **3 to 5 different visualisations**. Discuss three visualisations if they are rather complex; discuss up to five visualisations if they are rather simple. At the end of your presentation, very briefly outline your project idea.

Please discuss the following questions:

1. Domain, data, idioms

    a. What is the domain of your project?

    b. What information/data is being shown on the visualisations?

    c. What are the data idioms and channels used?

2. What is the macro reading?

    a. What is the author trying to communicate?

    b. What storytelling genres are being used?

3. What elements of the visualisation work well?

4. What elements are poorly designed?

5. Briefly: What do you plan to do to contribute to this domain?

For items 3 and 4, evaluate the following using theory discussed in this unit:

1. Are the visualisations informative? Are they efficient?

2. Is the interactivity appropriate?

3. What 'story' can the user encounter in each of the visualisations you have found. How are these different? How does the visualisation drive this?

Marking Rubric for Critical Review/Presentation of Proposal (Week 6)

	Poor	Satisfactory	Good	Very Good	Excellent
Scope of research: domain, data types, idioms, channels					
Review of the macro reading and storytelling genre					
Elements that work well					
Elements that are poorly designed					
Professionalism of presentation (slides, narration, timing)					
Total					

A strict time limit of 5 minutes is applied!

Instructions for the Written Report (Week 12)

Length: The maximum length of your report is 1500 words. Your report can be longer if it includes code listings that you programmed. Your report should be succinct and focused. Quality is more important than quantity.

Structure: Below is a suggested structure for the report, but you can adapt the structure of the report to your project. For example, you would add a section, if you used external software or developed your own scripts for data conversion. Select section titles and add subsections that are appropriate for your project.

- Title page: include author name, unit number and unit name, university, date, project title, and a link to your visualisation.
- Describe the domain, the problem your visualisation addresses, the motivation, and typical users.
- Critical review of related visualisations: Review existing similar visualisations, and describe how your visualisation improves upon these existing visualisations.
- A brief description of the design process and your design choices. You can include pictures of the five design sheet methodology sketches here or in an appendix.
- Sources of the data with full bibliographic details to locate the data.
- A description of your final visualisation including reasons for your choices. Describe how your visualisation allows the data to be interpreted in a way that effectively generates knowledge. Demonstrate that the visualisation idioms enable this knowledge and are appropriate for the data. Outline the innovative aspects of your visualisation. Describe how your visualisation shows an overview, allows to zoom/filter and provides details on demand. Describe how the viewer is guided through the visualisation by storytelling techniques.
- Bibliography: Cite sources, such as web pages, academic papers, books, newspaper articles, etc. in your text and place a list of bibliographic references in a separate section.
- Optional appendices: include code that you developed, or other relevant materials that are too long to include in the main body of your report in one or multiple appendices. Appendices do not count towards the 1500-word limit.

Important points to remember

- Make sure you describe external tools (besides Tableau), libraries (such as D3), or code that you developed to format data or create visualisations.
- Don't forget to include a URL to your visualisation on the title page and also submit the URL on Moodle.
- Document all data sources.
- Correct grammar and an academic writing style are important. Also make sure there are no typos and English language issues in your visualisation.
- Use correct scientific referencing and a consistently formatted bibliography. If you are unsure about academic referencing, use this resource as a guide: http://www.monash.edu/rlo/research-writing-assignments/referencing-and-academic-integrity/citing-and-referencing

Marking Rubric for the Written Report (Week 12)

	N	P	CR	D	HD
Motivation/Knowledge					
Related visualisations					
What? Why? How?					
5 Design Sheets					
Visualisation					
Professionalism of presentation					
Total					

Motivation/Knowledge (1 mark):
Description of the underlying reason behind your visualisation choice (this may be just your personal choice) and what kind of knowledge you're seeking from the visualisation. This is the 'executive summary' of the document.

Related visualisations (2 marks):
You should show 4 to 5 visualisations that are similar in purpose or theme as your visualisation field. You should list the primary question each is asking, along with good and bad parts of the visualisation (related to the visualisation theory). This is a written expansion of your week 6 presentations.

What?/Why?/How? (2 marks):
Discussion of the What, Why and How following Munzner's framework discussed in the lectures. This can be an expanded version of your Week 11 presentation.

5 Design Sheets (2 marks):
Presentation of the 5 design sheets, along with a discussion on each sheet and which elements were of use, in the context of the theory as described in the lectures. This can be an expanded version of your Week 11 presentation.

Visualisation (2 marks):
Screenshots of your visualisations and a discussion of the advantages and disadvantages of the final visualisation in the context of the theory as described in the lectures. You may mention the limitations of Tableau in your design choices, although you should reference any points that identify a restriction (ie. prove that the limitation exists in the software). This can be an expanded version of your Week 11 presentation.

Professionalism (1 mark)
Professionally presented document: Title sheet, table of contents, clearly labelled sections, appropriate references and bibliography. Good spelling and grammar throughout. No more than 3000 words.

Marking Rubric for the Visualisation (Week 12)

The visualisation…	N	P	CR	D	HD
… addresses the **needs of the domain** and users;					
… uses appropriate **data** of sufficient range and complexity;					
… provides meaningful **insight**;					
… shows **innovation**;					
… allows a clear **overview, zoom/filter and details on demand**;					
… **guides the user** with a clear user interface and graphic design.					
Total					

Extra credit can be awarded when the visualisation is created with D3, Leaflet or other technology besides Tableau. Students need to coordinate with their tutor before using such technology.

Needs of the domain
The visualisation has an obvious narrative that would be useful for an expected user of this data. The complexity and focus of the data and the narrative structure are appropriate for a typical user's abilities.

Appropriate data
The amount of data, the quality of data and the different types of data sources are adequate for the visualisation. Small datasets or simple datasets (e.g., with only a few different values) are typically inadequate.

Insight
The visualisation allows the data to be interpreted in a way that effectively generates knowledge. The visualisation idioms enable this knowledge and are appropriate for the data. The idioms are correctly applied and of sufficient complexity.

Innovation
The visualisation doesn't have to be wholly original, but cannot be a replica of an existing visualisation in the domain. Innovation may be shown in new interactivity, new combinations of data, or new visualisations of data.

Overview, zoom/filter, details on demand
The visualisation has each of these three elements in the design. These may be enabled through interactive design, or through the use of multiple visualisations in a static design, or both.

Guidance of the user
The viewer is guided through the visualisation by storytelling techniques. The user interface has a clear layout and is easy to understand. Important elements are visually accentuated by figure ground, annotations with appropriate typography, and an appropriate choice of colour and other visual channels.