

Module: Information Visualisation
Department: School of Computer Science and Electronic Engineering
Module credit: 20
Organiser: Prof. Jonathan C. Roberts

Assignments, Data analysis, design, implementation and presentation

The assessment is to take some data, explain it in a descriptive analysis report, make a sketched plan (a visual design) of what you will create, and develop and present the story of that data, as a visualisation poster.

There are three assessments, respectively, 25%, 25%, 50%

Deadlines 13 November, 4 December and 15 January.

Description and Contribution

In this assessment you will develop a *data visualisation story*, which will be presented in a poster, along with associated written reports.

The aim of this work is to

- develop your skills of information visualization design,
- demonstrate knowledge and skills of explaining data and analysing it.
- demonstrate your critical thinking skills,
- demonstrate that you can design and consider alternative (and appropriate) design ideas,
- develop a suitable solution that will be presented as a poster to create an information visualisation story, and
- demonstrate that you can reflect effectively on your work.

Your poster will need to have (at least) one main visualisation that has been created by yourself (e.g., not copied from an internet source), it ideally will have several visualisations, along with traditional parts, such as title, name of author, description of the topic.

The work is split into three assessments.

- **Assessment 1 – Data (25%).** You will write a “Data Composition and Insight Report for Visualization (Data-CIV)” following the given structure. I.e., you consider the data, explore its composition and use for visualisation; written as a report.
- **Assessment 2 – Design (25%):** You perform a visualisation design study, and write it up as a “Technical Design Plan”. You will use the Five Design-Sheet (FdS) methodology for your design study. Your sketched plan needs to consider (at least two aspects) (i) the data story, and (ii) how your poster will display this story in a clear way. You will need to consider alternative designs, and critically think about their suitability. In addition to the FdS method, you will critique your work using the Critique Design Strategy (CDS) to help you reflect on the work.
- **Assessment 3 – Implementation and poster creation (50%).** You will create your poster (single sheet presentation of your visualisation story). You will need to include metadata (labels, Titles, captions, etc.) and enough text to present your story. You also discuss and critique your work in a written critical reflective report, again using the CDS.

Notes about Posters

Posters are widely used within the academic community; they are a good way to present results in a concise way. They should be easy to read, quick to understand and tell an important and clear story. A good poster will contain enough labels, annotation and titles such that the data and the data-story are understood at one glance and detail information can be gleamed by detailed discovery. Therefore, think how you will display the data, and make sure you apply the good principles and techniques explained in the lectures.

For this assessment, you just need to create a poster output.

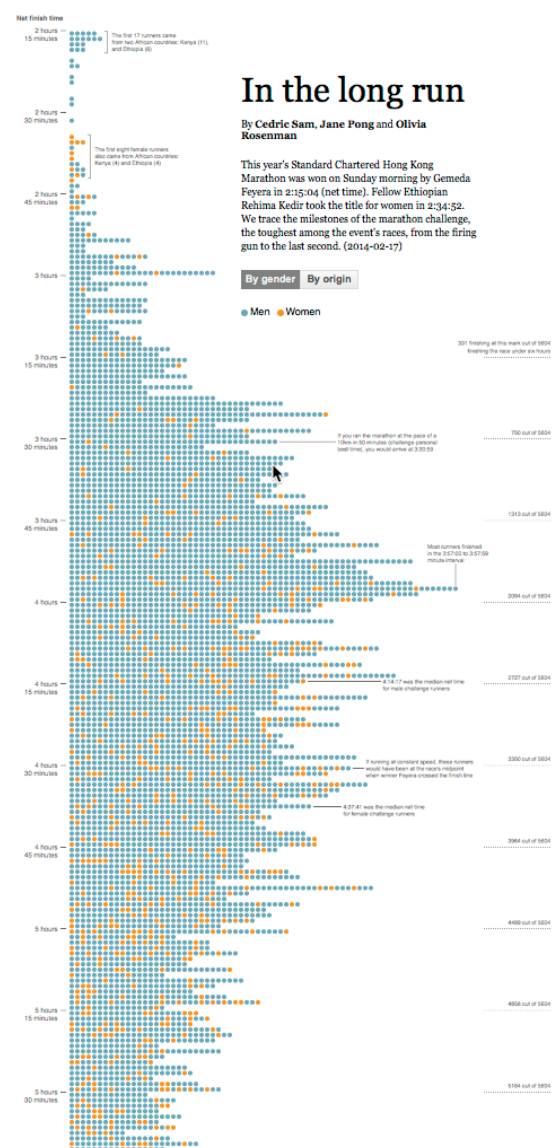
Remember to think about the following:

- Think about the **story** of the data. That is, what the data is saying, and what you can understand from the data. So you should carefully think about ‘what information are you presenting’ and how you are presenting it. Make sure that your visualization presents that story, plus gives the user the ability to find out more information, through interaction. Does the visualization tell you something about the data that you did not know before?
- Think about what data you are presenting, how it is **mapped** onto the graphical element, and how the user may interact with the display. You therefore, need to think carefully over the design, the layout of the information presentation, and how you are utilizing the available screen space, what type of graphical elements you are using etc. I also want you to think of a different way to present the data; design your own way to present the data, and make this visualisation the main point of interest.
- Follow **good practices** from the literature and my lectures. For instance, are you using a colour map? If so, then I hope it is not a rainbow colourmap! Follow ‘colour brewer’ principles. If you are using a colourmap then what is the data mapping? Is it a linear mapping? Do the range of colours that you use look nice? Are they accessible by people who are blind? Can you take a screen shot of your tool and print it on a black and white printer (and does it still make sense?).

An example

Cedric Sam and colleagues created a picture of the Hong Kong Marathon (right). In this visualisation every person is a runner, and is represented by a circle, and their times displayed by their position down the page. The authors have cleaned the data, organised it into a

Image above: ©Cedric Sam, Jane Pong and Olivia Rosenman



<http://widgets.scmp.com/infographic/20140217/marathon2014/>

Tasks for Assessments 1

- (i) **Choose (or find) an appropriate Open-Source data.** I have prepared a list of 50 datasets, and my suggestion is that you choose one off the list.
- (ii) **Think critically about the data and write the data report following the given structure.** As described in the lectures, you will consider questions, such as: What types of data do you have? How are they stored? What are their ranges? What relationships are there in the data?

Formatting. Please use the [ACM Master Article Template style](#). There are different versions

- Word use the [Interim Layout.docx](#),
- LaTeX use the [SIGCONF format](#)
- Overleaf, use the [ACM Conference processings Master template](#).

If you wish to choose a different dataset then you will need to select something that is not too large, yet large enough for you to explore different stories, if you choose your own, then you must check your chosen data with Professor Roberts.

Here are some useful links:

- <https://data.gov.uk>
- <https://www.data.gov>
- Academic torrents, making research data available <https://academictorrents.com>
- Reddit datasets <https://www.reddit.com/r/datasets/top/?sort=top&t=all>
- Data world, such as Climate Change Data; <https://data.world/worldbank/climate-change-data>
- Mortality rates: <http://www.guardian.co.uk/news/datablog/2012/nov/06/deaths-mortality-rates-cause-death-2011#data>
- Happiness index: how do we trust the government
<http://www.guardian.co.uk/news/datablog/2012/nov/02/happiness-index-how-much-trust-government>
- Every Wimbledon Tennis winner
<http://www.guardian.co.uk/news/datablog/2011/jul/04/wimbledon-winners-list>
- Tuition fees what universities are charging
<http://www.guardian.co.uk/news/datablog/2011/mar/25/higher-education-universityfunding>
- Twitter, 100 most followed <http://www.guardian.co.uk/news/datablog/2011/mar/21/twitter-100-most-followed-users-data>
- R, dataset library <https://vincentarelbundock.github.io/Rdatasets/datasets.html>

REQUIREMENTS FOR SUBMISSION OF ASSESSMENT 1

- Submit a 1500 word written report of your data, following the Data Composition and Insight Report for Visualization (Data-CIV) report structure. This should be a 4 or 5 pages report.
- Include any images, analysis, tables as appropriate in this page count.
- Make sure figures have captions, labels and are referenced in the text.
- Follow the Data-CIV guidance structure.
- Submit as a single document in MS Word or PDF.
- Make sure it loads/displays and is readable in the online Blackboard browser (i.e., no ZIP, no non-typical fonts, etc).
- Write in your own words. Do not copy text from the internet. If you have any quotes from other research papers, then make sure they are indicated appropriately in quotes “..”, with appropriate attribution.

- Make sure images are appropriately attributed to their creator and author – otherwise you will fall foul of university plagiarism rules.
- You are not allowed to use AI tools to write the work for you. But you may use tools such as Grammarly and AI to help you write and improve grammar.

Tasks for Assessments 2

Continuing with the same data, from assessment 1.

For assessment 2 perform a Five Design Sheet - design study of your data.

The best solutions will head towards a new visualisation that takes central stage on your poster. Much like the “In the long run” example above.

Follow the procedure presented in the lecture, and examples from the Five Design-Sheet book, or papers, placed on Blackboard. Perform the FdS design sketching on A3 sheets of paper. The larger paper makes it easier to write, but then you can scan it to A4 size. Include these scanned images in your report. When you scan it, make sure it is clear to read, as you will need to include these scanned copies with your Technical Design Plan document.

Perform a Critical Design Strategy (CDS) on your chosen design (sheet 5). This should help you think through your ideas. If you need to, make a realisation sheet (and if you do this, include it also in your final technical design plan).

Write your Technical Design Plan that reflects on your design decisions, explains the data, and demonstrates that you understand visualisation data analysis and visualisation encoding schemes. Structure this as follows:

- (i) brief outline of the data,
- (ii) alternative designs: balanced presentation and discussion of alternative designs based on the FdS designs,
- (iii) balanced critical reflection of alternative design strategies based on the CDS, and especially finishing with a detailed description and presentation of the chosen design.

Make sure plan includes your name, a title, introduction, the three middle sections (i,ii,iii), a summary, and any references.

Formatting your Technical Design Plan. Please use the [ACM Master Article Template style](#). This will mean that every design plan will look similar. There are different versions

- Word use the [Interim Layout.docx](#),
- LaTeX use the [SIGCONF format](#)
- Overleaf, use the [ACM Conference processings Master template](#).

REQUIREMENTS FOR SUBMISSION OF ASSESSMENT 2

The Technical Design Plan is one written document of several pages. It will be graded from this ONE document. It should present about 10 hours of effort. It will need to include figures, and description/discussion of your designs.

- Submit one document (MS Word or PDF).

- The written part should be <1500 words.
- Include Figures (with captions, and labels, Figure 1, Figure 2, and so on).
- At the end of your Technical Design Plan include full (one page for each) scans of five pages for the FdS scans (all 5), and the completed CDS.
- Make sure these scanned images are clear, and sensible file size (do **not** make the file too huge. It needs to be readable and loadable for a Mobile reader, on blackboard).
- Make sure that the scans/figures are **clear**. And the detail is readable.

ZIP of all material

1. A ZIP of all your images/scans (at higher resolution) can be uploaded.

Marking Scheme, for Assessment 1 and 2

What I am looking for is how well you have analysed the data (assessment 1) and considered alternative ideas (assessment 2), followed the FdS process, and understood each of the stages. For instance, do the FdS sheets contain the correct information, have you got 5 sheets with 5 parts, does the information relate well between each of the panels (and within each sheet), is the information is relevant, do the sketches and ideas show creativity and novelty, is there a spread of designs (especially over sheets 3,4,5) and no repeated information.

Good solutions represent novel and different designs. See the “In the long run” poster example. It includes each runner as a rectangle and colours it appropriately. This could be achieved through using Processing.org.

There are other solutions, that would follow traditional visualisation styles. Therefore, it is possible to create the poster using traditional and well established visualisation styles, including Bar charts, line graphs and pie charts (for example). But these will develop less creative posters and will not sustain the highest scores.

In your planning, think about how you can display your data in an interesting and creative way. Think about the examples (given in the lectures) such as the poppy-visualisation (for the war data), or the long-run visualisation (above, for the London runners).

The first two assessments help you plan your work, and each are 25% of the assessment.

- The Data-CIV report is 25% of the overall assessment, and the Technical Design Plan is 25%. With this work, you will be demonstrating that you clearly understand the data.
- For the Design, you will demonstrate how you have used the Five Design-Sheet analysis. You will need to demonstrate that you have considered alternative designs, and the critical reflection of the different designs, their presentation and discussion and use of the CDS. Evaluate your ideas using the Critical Design Strategy (CDS). Reflect on your design, story presentation, evaluate it using a CDS, you can also gain feedback from others. The presentation must be clear, suitable in size, and the figures readable, sensible and relate to the text (labelled and captions, etc).

	Assessment 1	Assessment 2
>80	Demonstrable clear evidence that you understand fully the data. Understand the breakdown of the parts: continuous, discrete and so on. Exceptionally well organised, structured, and so on. Exemplary answer could be used as a demonstration. Highly detailed. Well use of tables, diagrams as appropriate.	The FdS demonstrates a perfect balance between text and diagrams/sketches and demonstrate a wide breadth of different ideas and much creativity and much novelty. Clearly demonstrate that you have followed the FdS process and organised the ideas exceptionally well. The reflection and understanding of the CDS results, and reflection on the design is exceptional, well balanced and well argued. Clear presentation of the final design.
>70	An excellent data analysis that demonstrates you know about the	The FdS is clearly and neatly presented, and the presentation of

	data. Clearly presented. Well organised.	the FdS demonstrates that you have followed the FdS process appropriately and organised the ideas well. The Technical Design Plan is clearly laid out, follows the appropriate structure, and is easy to read. It includes all the necessary parts, including a well-balanced critical review that integrates the results from the CDS.
>60	A clear analysis that demonstrates that you have followed the process and have organised the ideas. Clear to follow. You have thought about the data. Some details may be missing, but a good submission.	A clear Technical Design Plan that demonstrates that you have followed the process and have organised the ideas and they are clear to follow and the FdS has a reasonable balance between the amount of text and sketching, as appropriate, and the plan is clear and demonstrates you have considered the data, story and different alternative ideas.
>50	A reasonable data analysis. There may be some problems with clarity of information, but the basic principles of the analysis has been followed and most of the information is contained appropriately.	A reasonable technical design. There may be some problems with clarity of information, but the basic principles of the plan has been followed and most of the information is contained appropriately.
>40	A threshold performance. Some information about the data. Some details about the goals. Information may not be clear in places. But an attempt has been made with some reasonable results.	A threshold performance, however the Plan has some significant problems and parts could be made much clearer. However, a reasonable attempt has been made, and some of the required information is placed on the plan.
<40	A less than satisfactory performance. It is a shame that the information has not been analysed to any depth. Some attempt has been made to explain the data.	A less than satisfactory performance. It is a pity that the Technical Design Plan has some significant mistakes and the information that is presented can be improved substantially. Little attempt has been made to follow the instructions. There may be much repetition between sheets 2,3,4 on the Five Design Sheet, and only a basic presentation of the data.

Task for Assessment 3

Continuing from the previous assessments, and using your same chosen dataset, do the following tasks

Implement/create the visualisations. The visualisations should follow your technical design plan (assessment 2) that you presented on Sheet 5 (the realisation sheet).

There should be a **main visualisation** that will be the **focus of your poster**. You may need to **implement other supporting visualisations**, as described in the storytelling lecture, these could be **drill-down views**, or **other multiple views**, and so on that **explain some part of your story or other subsidiary visualisations**.

Write the story. Through the visualisation exploration you should have an idea of the story. **You will need to write the story, such to make the text clear and easy to read.** Enough text is required to help tell the story.

Make the poster. You will need to **include metadata (labels, Titles, captions, etc.)** and enough text to present your story. Pull all the work together onto one poster design. Make sure the poster is formatted in portrait format, and fits A1, the **A1 size print measures 59.4 x 84.1cm.**

Evaluate your poster using the Critical Design Strategy (CDS). Reflect on your design, story presentation, evaluate it using a CDS, you can also gain feedback from others.

Write a critical reflection report, with the following parts:

- (i) **Introduction:** briefly introduce the reader of the data, and the focus of the final work.
- (ii) **Implementation details:** explain how you have implemented the visualisation, how it was created and what software you used
- (iii) **Storytelling:** Present a brief outline of your findings, and the story you are telling, include **figures/labels** where required
- (iv) **Reflection:** present a **balanced critical review of your poster and implementation**, use the CDS to help you with this reflection.

REQUIREMENTS FOR SUBMISSION OF ASSESSMENT 3

Submit together in one submission – the report, and the zip.

The **report is one file with its first page as the poster**, and the following pages as the report including all **necessary images** and figures with a **ZIP of your code** and other supporting evidence.

The report has:

1. **First page**, with the **one-page-poster**. The visualisation poster presents your visualisation(s) and story.
2. **Next few pages:** The reflective report approximately <1500 written words.
3. **Appendix with code, CDS copies, as required**

The zip includes

For grading purposes and marking, we require a ZIP of all your parts, **including poster, images/scans (at higher resolution), code to create the visualisations.**

Marking Scheme. Marks awarded for the poster itself along with the implemented visualisation, the reflective report and use of the CDS of marks will be awarded for:

1. The overarching **appearance** of the poster, it's layout, good use of colours, shapes, spacing etc. Suitable **metadata**, titles, sub-visualisations, arrows, highlights, and legends/key, labels [20]
2. The clarity of the **story** in the poster, the flow of the story from the top to the bottom, use of the main visualisation to tell the story with data, and labels and inclusion of text for the story, etc. [20]
3. The visualisation **mapping** and the effectiveness of the data mapping, the layout of graphical properties and how you have used good design principles and suitable visual (retinal) variables. [20]

4. **Explanation** of your story in the report, and how your poster presents this story. Details of what you have achieved. Critical balanced reflection of the work, your poster, and use of the CDS [40]

Grades as follows:

>80, exceptional story. Visualization clearly demonstrates new knowledge about the data. Exceptionally clear presentation of data. Outstanding ability to eyeball the visualisation and for a user to know what is important, and thus has clearly defined pre-attentive parts. The work could be used as an exemplar of good practice, good data journalism and thus placed in a public space without change. Exceptional mappings. Clear demonstrable understanding of retinal variables. Outstanding use of screen space. Exemplar design and use of mappings. Outstanding novel design, potentially publishable material, possible to publish online. Demonstrable outstanding use of good practices such as colour use, font size, legends, labels, details on demand etc. Excellent reflection and balanced critique of your work. Excellent use of CDS, especially to influence and inform the report.

>70, excellent story. Clear representation of key points and demonstrates discovery of new information from the visualization. Good evidence of data journalism skills through information visualization and could be placed around the School corridor. Excellent mapping. Good understanding of retinal variables, and how to map information. Creative design and novel layout. Excellent use of good practices. Careful use of colours and other aspects of good practice, reasonable reflection and use of CDS and understanding of good practices given in the report.

>60, clear story is presented, some new information discovered through the visualization. Good layout, good use of screen space. Some creativity demonstrated. Some thought of original design and appropriate use of retinal variables. Good evidence of care over the use and choice of visual artefacts and good reflective reporting.

>50 good presentation that demonstrates a suitable story. Although there may be some problems with the story and its visualisation, it is still understandable. Attempt to use appropriate mappings, maybe some flaws in the mappings, but overall, a reasonable design. Some evidence of the thought and consideration of the choice of components and layout and some evidence of critical reflection. Reasonable critical and balanced reflection.

>40 Threshold performance. Demonstrate some idea of mappings and retinal variables. Some problems with the display, and clarity over what is being represented, but still some appropriate data mappings. Some critical thought and presentation of the data.

<40 Major issues with the clarity of presentation and what the visual depiction is representing. Little overall consideration is evidence, but some appropriate use is included, some evidence of reflection on the work. Little of no knowledge of good practices in information visualization; little reflection and no critical reflection of the work.

Feedback details for all parts

	Description	Timeframe
Formative (On-going)	Verbal Feedback – Verbal feedback will be available by request at the relevant lab session. It is suggested that you keep a written note of this feedback to aid in your personal development.	Instant
Summative (Post Assessment)	Written Feedback – Written feedback will be made available through blackboard after an assignment is submitted. To access your written feedback see the comments section of your assignment submission.	2-4 weeks

Plagiarism and Unfair Practice for all parts

Plagiarised work will be given a mark of zero. Remember when you submit you agree to the standard agreement:

This piece of work is a result of my own work except where it is a group assignment for which approved collaboration has been granted. Material from the work of others (from a book, a journal or the Web) used in this assignment has been acknowledged and quotations and paraphrasing suitably indicated. I appreciate that to imply that such work is mine, could lead to a nil mark, failing the module or being excluded from the University. I also testify that no substantial part of this work has been previously submitted for assessment.

Additional notes:

- Remember, tools like Grammarly are excellent to help you write better.
- Do not use AI to generate the text for you. It is often incorrect and presents wrong information that is often factually incorrect.
- Make sure claims are approximate and considered. Whether generated from AI, or not, make sure you do not make claims that are false or unsupported by your work. For example, if you use data that has been already cleaned, do not claim that you have cleaned it. If you use a bar chart, do not claim that this is a new type of visualisation.

JCR/Draft V1.3/InfoVis