# Coursework 1: Information Visualisation

## KEY INFORMATION

- Teams of 3
- Individual: 3 designs and report + 2 peer feedback. In teams: integrated design and report
- Master students have additional requirements
- **Due at 11:00 AM on Wednesday 8 March 2023**
- Feedback at 11 AM on Wednesday 29 March 2023
- Coursework 1 is worth 20% of the CSC337/CSCM37 module

## LEARNING OUTCOMES

❏ Students can analyse abstract vis tasks.
❏ Students can choose and justify visual encoding and interaction idiom for vis tasks.
❏ Students can create their own vis with vis tools.
❏ Students can critique visual encodings based on their expressiveness and effectiveness.

## GOALS

Create vis to reveal insights about the airports and routes based on the data from OpenFlights[1]
Your vis may encode the raw or derived data to reveal obvious information, such as:

1. How many airports are in each country?
2. Which airports are the busiest?
3. What are the routes with the least stops between airports X and Y?

There are also some less obvious questions, such as:

1. Are there any interesting patterns or trends in the data?
2. What insight can we gain from multi-variate visualisations of the data?
3. Which location has the densest flight connections?
4. Which routes are likely to cause jet lags?

## TASKS

**Teaming up:**
Establish:

- a team communication method (chat group, exchange phone numbers)
- shared meeting note (e.g., a Google Doc) and workspace (e.g., Sharepoint or Google Drive)
- one person as the team coordinator
- communication expectation: how fast should replies be expected
- shared free slots on the schedule that could be booked for team meetings or co-working

See further tips for teamwork and meeting in appendix 1.

**Phase A: Individual design.** Suggested finish date: 22 February.

1. Produce **three different** visualisations that can convey meaningful and interesting insights about the data. Overall, they must effectively support **at least two different abstract tasks.** These vis must be beyond bar charts, scatterplots, and line charts—which are demonstrated in the lab. There is no need for all team members to use the same vis tool in this phase.

[1] https://openflights.org/data.html

For **master students (CSCM37), at least two** out of three vis must use additional data source(s). Look for data sources from the Eurocontrol, Data Is Plural archive, Kaggle[2], or other sources.

2. Write a max. one-page report with the following sections:
   - **Goal(s):** What do you want to learn from the visualisation?
   - **Image of the visualisation:** Ideally, it should be apparent
   - **Insight:** What is the answer or insights you discovered with respect to the goal(s)?
   - **Data Abstraction:** Describe how you map the (preprocessed) data to the abstract *dataset types* and *data types*. The data abstraction could be the same for all three vis or different if you derive some data prior to visualisation. (See Chapter 2 of Munzner's book, and week 1 of the lecture.)
   - **Task Abstraction:** Describe how you map the goal or task that you describe above to the *abstract tasks*. (See Chapter 3 of Munzner's book, and week 2 of the lecture.)
   - (Master students only) **Additional data source(s):** Provide the URL of the data source(s) and describe how they are integrated into the given data sources.
3. Save your report in PDF in addition to its original format.

**Phase B: Individual peer feedback.** Suggested finish date: 26 February.

1. Circulate the report to all team members on the same date. At this stage, you may circulate the report in its source file (MS Word, Google Doc, or etc.) to make commenting easy.
2. Pick **one design from each team member**. The design you choose should be different from your work, if possible.
3. Rate the design with the section "Individual: Report" of the grading rubric.
4. Additionally, add comments on the report to highlight both positive aspects and potential improvements.
5. Save the feedback and comment in PDF. Each student should have two PDF files from the other two team members. Each PDF must contain the original report with comments and the rubric table with ratings.

There is no need to improve an individual's work based on the peer feedback. Instead, carry over the lessons learned to the team integration in the next phase.

**Phase C: Team integration.** Coursework deadline: 8 March 11:00 AM

1. Agree on the vis tool of your choice to implement the integrated work.
2. Create a vis with multiple coordinated views. This vis could be based on some of the previously created individual vis, or it could be entirely new. You may use bar charts, scatterplots, or line charts in some but not all of the views. However, their use must be justified with respect to the data and task abstraction.
3. Write `README.md` (or `README.txt`) with instruction on how to make the code run.
4. Write a max. 1.5-page report (in PDF) with the following sections:
   - **Goals:** The integrated visualisation must aim to support multiple goals.
   - **Image of the visualisation, Insight**, **Data Abstraction**, and **Task Abstraction**
   - **Encoding:** Describe and justify your encoding choices.
   - **Interaction:** Describe and justify interactions you have built, especially how they add value to the visualisation beyond still images. For this section, you may add small images to show specific interactions.

---

[2] https://ansperformance.eu/data/
https://docs.google.com/spreadsheets/d/1wZhPLMCHKJvwOkP4juclhjFgqIY8fQFMemwKL2c64vk/edit#gid=0
https://www.kaggle.com/datasets?tags=13208-Data+Visualization

5. Prepare the coursework submission package as shown in Figure 1. Submissions that are not organized according to the folder structure in Figure 1 will be penalized. See grading rubrics below.
6. Create a **.zip file**. Make sure extracting this zip file properly recreates this directory structure.
7. Upload the zip file to Canvas.

**Phase D: Peer assessment.** Deadline: 10 March 11:00 AM (after the official coursework deadline)
Read the instructions for peer assessment on Canvas[3] *(available from 10 Feb.)*.

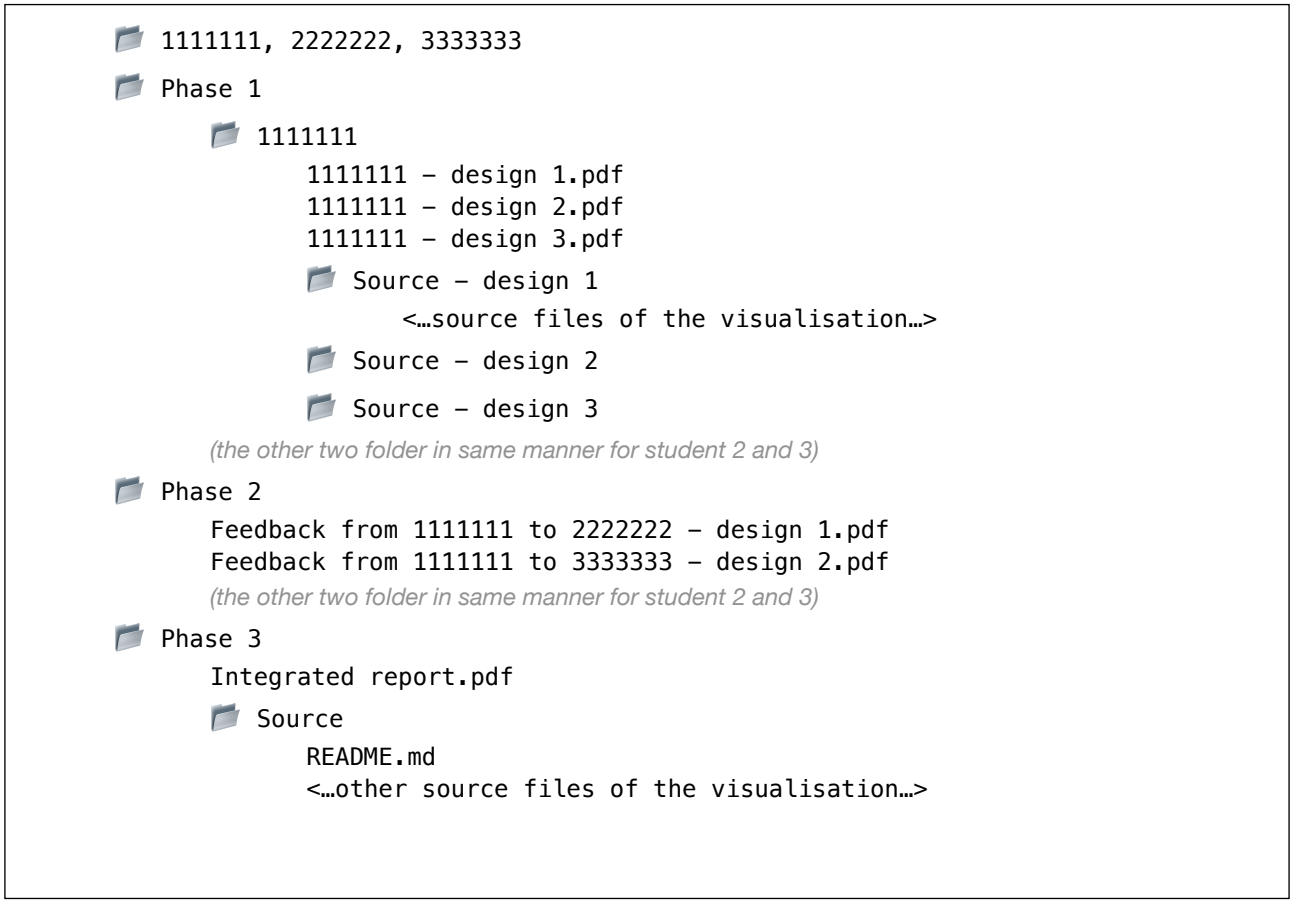


**Figure 1.** Example folder structure. (1111111, 2222222, 3333333 are example student numbers)

## ELIGIBLE VIS TOOLS

Here is a list of visualisation tools you may use for this assignment. You can potentially use something else, but you must clear it with Chat first.

- Vega-Lite (JS)
- Vega (JS)
- D3: Data Driven Documents (JS)
- Altair (Python)
- vegalite (R)

You may use these tools independently (e.g., creating a set of HTML, Javascript files from scratch) or use them on Notebook platforms (e.g., Observable, Collab, Jupyter, or RStudio).

[3] https://canvas.swansea.ac.uk/courses/36447/pages/peer-assessment

Packages like `ggplot2` and `matplotlib` are deliberately excluded because it is not easy to produce interactive tools using them. Tableau, Lyra, and Plotly are not permitted because we wish you to be able to create visualisations from code.

## GET HELP

You may ask questions at https://visguides.org/ if you need help with specific visualisation techniques. For the administrative questions, post them on the Coursework 1 discussion board[4]. You may also visit Chat's drop-in hours[5] for interim feedback.

## ACADEMIC MISCONDUCT

By submitting coursework, electronically and/or hardcopy, you state that you fully understand and are complying with the University's policy on Academic Integrity and Academic Misconduct. The policy can be found at https://myuni.swansea.ac.uk/academic-life/academic-misconduct. The consequences of committing academic misconduct can be extremely serious, and may have a profound effect on your results and/or further progression. The penalties range from a written reprimand to cancellation of all of your marks and withdrawal from the University.

## GRADING RUBRICS

Coursework 1 is worth 20% of the CSC337/CSCM37 module. Submissions that are not organized according to the folder structure in Figure 1 will be penalized by 5% overall.

| **Overview** | **Weight** |
|---|---|
| Individual: Code* | 9% |
| Individual: Reports* | 36% |
| Individual: Peer feedback | 15% |
| Team: Integrated work | 40% |
| | **100%** |

* For **master students** (CSCM37), at least two vis must use additional data sources. Otherwise, the individual marks in the code and report section of two vis will be capped at the mark of 60%.
* Bar charts, scatterplots, and line charts are not accepted for the individual code and report part.

*Individual: Code* *(3% per vis, totalling to 9% overall)*

| **Criterion** | **Mark of 0%** | **Mark of 60%** | **Mark of 100%** |
|---|---|---|---|
| Runnable code code for each design | No code provided | The code has some correspondence, but it cannot reproduce the exact design. | The code can reproduce the exact design. |

[4] https://canvas.swansea.ac.uk/courses/36447/discussion_topics/323655

[5] http://tiny.cc/chats-drop-in-hours

*Individual: Report* *(evaluated for each design) Use this part of the rubric to give feedback in Phase B.*
Report will no code receives the mark of 0% for all criteria. Absent or irrelevant content receives the mark of 0%.

| Weight | Criteria | Mark of 40% | Mark of 60% | Mark of 100% |
|---|---|---|---|---|
| 2% | Goals and insights | Unclear description of the goals or insights. Lack of correspondence between both. | – | A clear description of goals and insights. |
| 2% | Data abstraction | – | More than half of the description corresponds to the data and the vis. | The description completely corresponds to the data and the vis. |
| 3% | Task abstraction | There is a correspondence between the task abstraction and the goals. | Task abstractions are described in detail with some flaws or misunderstandings of the task abstractions. | Task abstractions are described in detail, with high- and low-level tasks. No misunderstandings of task abstractions |
| 5% | Image of the vis | The image is in an inadequate quality or crop area to show the vis. | The image is of appropriate quality, but it is unclear how the stated insights could be drawn from the vis | The image clearly shows the insights as described. |
| **12%** | per vis. Totalling to 36% overall | | | |

*Individual: Peer feedback* *(evaluated overall)*
The absence of feedback receives a mark of 0%. If you did not give feedback to all some team members, the overall mark for this part will scale accordingly.

| Weight | Criteria | Mark of 20% | Mark of 60% | Mark of 100% |
|---|---|---|---|---|
| 5% | Specific | The location of that the feedback applies is vague, unclear, or ambiguous. | More than half of the feedback refers to specific aspects/parts of the visualisation or report. But some feedback are unspecific. | All feedback refers to specific aspects/parts of the visualisation or report. |
| 8% | Application of the vis concepts | No vis concept used to justify the feedback. | Some vis concepts were used in the feedback, but there were misunderstandings. | Feedback heavily rely on vis concepts, and these concepts were used with the correct understanding. |
| 2% | Constructive | The feedback has only negative tone. | There is a mix between constructive and purely negative tone. | The feedback points out both strengths and limitations of the work (wherever applicable). |
| **15%** | overall | | | |

*Team: Integrated work*

For this part, you will receive the baseline grade for the group. The individual grade will be adjusted according to an anonymous WebPA report (see Task Phase D). If you do not submit the WebPA report, you forfeit your right to influence the grade. Absent or irrelevant content receives the mark of 0%.

| Weight | Criteria | Mark of 20% | Mark of 60% | Mark of 100% |
|---|---|---|---|---|
| 10% | Runnable code | See the criteria from the "Individual: Code" section | | |
| 2% | Goals and insights | See the criteria from the "Individual: Report" section. | | |
| 2% | Data abstraction | | | |
| 2% | Task abstraction | | | |
| 2% | Image of the vis | | | |
| 8% | Encoding | Misunderstandings or ineffective use of encodings are prevalent | A clear description of visual encodings. But there are some misunderstandings or ineffective use of encodings. | A complete, clear, and correct description of visual encodings. Most encodings have high effectiveness and expressiveness. These choices are clearly justified |
| 8% | Interaction | Very few interactions were implemented. Or the report did not clearly describe them. | Most interactions support the goals, and they are clearly communicated in the report. But there are some unjustified interactions or misunderstandings of vis concepts. | The interactions clearly support the goals, and they are justified. They are effectively communicated in the report. |
| 3% | Overall writing and formatting quality of the report | Many writing problems such that the report is difficult to understand. | Some misspellings and grammatical mistakes. The report has inconsistencies such that it is clearly written by multiple people. | Very few spelling and grammatical problems. The quality of the writing is consistent throughout. |
| 3% | Code documentation | – | Instructions for running the code exist, but there are some unclear parts. | Reproducible instruction for running the code. |
| **40%** | overall | | | |

# Appendix 1: Teamwork and meeting guide

## COORDINATOR ROLE

At each moment of the project, there should be one person who spend around 30% of the time on the project to plan and coordinate team members. This person should know the overall status of each part of work in the project and is responsible to communicate and push the project forward.

If a team member is absent from the communication for more than a week, the issue is reported to the coaches together with the traces of communication (e.g., email that was sent or screenshots of chat messages with date)

## MEETING TIPS

1. Before each meeting, write a list of goals that is aimed to achieve in the meeting. This is the agenda.
2. Consider which participants are necessary to discuss each point. Not everyone has to be present in all meetings all the time.
3. Have a dedicated person to take notes for each meeting. Team members take turn to be the note-taker. When the note-taker speak, another member should help taking notes.
4. Note-taker summarise the points that were discussed, decisions that were made, and questions that still remain. No need to transcribe the meeting verbatim.
5. At the end of each meeting, there should be clear task assignment: who should do what, by when, what is the scope, and what are criteria for accomplishment.
6. In follow-up meetings, revisit the assigned tasks and update their status. When necessary, revise the scope and the deadline of the tasks that are carried over.

## MEETING NOTES

Meeting notes serves several purposes:

- During the meeting, the notes represents the common understanding among the participants.
- After the meeting, the notes helps the meeting participants to recall points discussed.
- Prior to subsequent meetings, a quick read of the notes from the previous meeting and the agenda of the upcoming meeting lets the participants mentally activate relevant information and physically prepare relevant materials in anticipation for the upcoming discussion.

To best serve these purposes we recommend the following:

1. Create a shared document with the newest meeting at the top (reverse chronological order).
2. In each entry, list who were present at the meeting and the date and time of the meeting.
3. During the meeting, ensure that all participants can see what is written in the notes in real-time. If there are ambiguities or misunderstanding, they can be immediately corrected.