INFOB2DA | Practical Assignment 4

Dashboard visualizations and coordinated view systems (Total 100 Points)

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Submission deadline:
Sun, 26.10.2025, 23:59.

General information

- You must form groups of 3 students. Individual submissions are only accepted in special cases. Each group member must understand the entire assignment, including the code which you will create!
- Submission deadline: Sunday, 26.10.2025, 23:59pm. You will have to present your submissions on Monday, 27.10.2025 in the regular exercise/werkcollege slot. If you are unable to present your work there, send us an email.
- If you have questions or need more information, you can always use the Questions channel on Teams, or our Office Hours.
- You are only allowed to use the Python programming language in your code.
- For this practical assignment, you can achieve 100 points in total. Your overall practical assignments grade will be determined by the sum of your points in PA1-4.

Handing in your assignment
Depending on the chosen level hand in your project files and presentation slides as a ZIP-file on MS Teams. Make sure you press the submit/inleveren button after uploading your files in Teams, otherwise the submission is not completed.

Introduction

The aim of this practical assignment is using acquired knowledge about data visualization to answer the following question: "*How to create effective interactive dashboards for the dataset at hand and present to a client the findings of your exploration?*"

After this assignment you will be able to …

1) … apply standard practices for visual analysis.
2) … convey information effectively through visualizations.
3) … have a structured approach to solve data visualization problems.
4) … communicate the data findings and engage in data storytelling.

Dataset overview

The U.S. Department of Transportation's (DOT) Bureau of Transportation Statistics (BTS) tracks the on-time performance of domestic flights operated by large air carriers.[1] Summary information on the number of on-time, delayed, canceled and diverted flights appears in DOT's monthly Air Travel Consumer Report, published about 30 days after the month's end, as well as in summary tables posted on this website. BTS began collecting details on the causes of flight delays in June 2003. Summary statistics and raw data are made available to the public at the time the Air Travel Consumer Report is released.

The airlinedelaycauses_DelayedFlights.csv file contains flight delay metrics for 1.247.486 different flights. The dataset contains 30 different features, both numerical and categorical.

Structure and Difficulty of the PA

This PA serves three levels of implementation effort from which you can choose for your group. Each level results in different maximum points that you can achieve, but also less guidance you can expect from the TAs. The level you choose is a commitment for the whole PA, so make sure to have a group discussion beforehand.

Level 1 entails the use of proprietary data visualization tools, such as Tableau, Knime, Spotfire, JMP, that you may use as a no-coding solution to perform the tasks stated below.
(Maximum 40 reachable points for Task 1)

Level 2 entails the lowest level of interactivity using scripting (only) in Jupyter Notebook. You are allowed to use all tools you deem fit, e.g., Plotly, Seaborn and Matplotlib and extend this tool chain as you wish. We do not expect interactivity beyond "rerun the script/cells" for this level.
(Maximum 55 reachable points for Task 1)

Level 3, the most programming intensive level, in which you can freely pick from the available visualization libraries, beyond the tools we showed in INFOB2DA. In this open playing field you could explore, for example Dash Plotly, D3.js and C3.js, Bokeh, R Shiny, Vega(-Lite). You can use systems that allow you to render charts on demand, but you need to implement the coordinated view system on your own to reach the full points.
(Maximum 70 reachable points for Task 1)

[1] Dataset description copied from: https://www.kaggle.com/giovamata/airlinedelaycauses

Task 1: Create an interactive dashboard (Points depend on level)

Goal: After you have achieved this task, you are able to create an informative visualization dashboard.
Graded result: The results of question 1.1 must be visible in your project files and the presentation.

1.1 Analyze the provided dataset. We expect you to incrementally draw conclusions about the dataset by investigating it through visualizations – i.e., if when exploring, one visualization caught your attention, develop deeper and deeper insights by using new visualizations. Create an informative visualization dashboard showing at least five useful, distinct visualizations of which one should go beyond standard charts *(Side note: you can even use tools like Tableau for advanced visualizations of high-dimensional data[2])* . These visualizations should be interactive and behave as a coordinated views system (depending on the chosen level). Set of random examples of an interactive dashboard, brushing-and-linking in D3, Bokeh Linking

Task 2: Reflection (30 Points)

Goal: Practice to communicate your findings to domain-experts and domain-novices.

Graded result: Presentation (***max 15 minutes per group including Q&A from TAs; we accompany more presentation slots to achieve the full 15min/group***) and presentation quality/structure, PDF with screenshots along with descriptive text (e.g., annotations, captions, bullet points to highlight specific findings), data and performance tables and charts, code quality and cleanness, knowledge of each team member of the code (make sure to have the code running during the presentation/Q&A).

Guiding Questions (loose guideline on the kind of questions you should answer in your presentation; list is non-exclusive; does not impose any order; answering all questions is not obligatory for full points; we intentionally give less guidelines from PA2 onwards):

- Reflect on how interactive analysis aspect can help you to answer questions (easier).
- Why did you choose these visualizations for communicating your insights?
- Tell us a data story.

[2] https://dataviz.love/2018/12/07/parallel-coordinates-tableau/