Course Assignments
for

Information Visualization (TNM111)
Spring 2023

Assignment 2

The deadline for this assignment is on Monday, Jan. 30$^{\text{th}}$, 2023 (at 23:55).

Task 1 *Basics and Interaction*

Answer the following questions.

1. Explain in **detail** the InfoVis Reference Model. What are the strengths of this model?

2. What kind of interactions are supported by Range Sliders? Is there a way to improve them in order to show more information? Make a short list of pros and cons.

3. In most visualization systems selecting or highlighting a data object in a specific view leads to a highlight in another view. What is this interaction technique called? What are its advantages?

Task 2 *Sketching a Visual Encoding (Originally authored by Tamara Munzner)*

Sketch a suitable visual encoding for the table below. The sketch should include all of the items and attributes for that table as a static visual encoding: do not assume any interaction will take place. You may use a single view or multiple views. You can sketch it using pen and paper, or any sketching software of your choice.

Analyze the sketch, considering whether it is suitable according to the alignment between chosen visual features:

- attribute types/values (in terms of expressiveness and effectiveness),
- semantics of the attributes (an important part of data abstraction), and
- information density (we strive for a balance between maximizing information density and avoiding cognitive overload).

Name	Age	Best 100 m (s)	Furthest Jump (m)	Sex
Anna	16	13.2	5.2	Female
Maria	18	12.4	4.2	Female
Sara	14	14.1	2.5	Female
Adam	21	11.2	6.1	Male

Task 3 *Implementing a scatter plot*

In this assignment, you will implement a scatter plot visualization, but without the usage of higher-level libraries in order to understand how the visualization is created from scratch. You are therefore **not**

allowed to use any visualization libraries for this assignment.

You can use whichever programming language you prefer (such as HTML/JavaScript or Python), but without using visualization libraries such as D3.js or Matplotlib. However, you are allowed to use libraries to read CSV files and process data (such as pandas or csvreader). You are also allowed to use libraries such as Tkinter to draw and render GUI elements (buttons, shapes/colors for the data points, and straight lines for axes and grids).

Your application should be able to load and visualize the data sets found in the "Assignment 2" folder on Lisam. Your visualization tool should at least be able to:

- Draw the x- and y-axis, together with the ticks and tick values.

- Display a legend that shows the categorical information.

- Display the categorical information of the data points by using different shapes to represent the points.

- Display the data points correctly with respect to the axes.

- Set the value range automatically based on the data values present in the data set.

After implementing the basic scatter plot, you should also add the following two features when interacting with a data point:

- When left-clicking with the mouse on a data point, a new grid system will be used where the selected point will become the new origin. The other points should get distinct colors depending on which quadrants they are located in. This new grid system is deactivated when the user left-clicks on the selected point again. Do not forget to mark the selected point somehow, e.g., stroke or highlight around the shape.

- When right-clicking with the mouse (or by using any other interaction of your choice, e.g., ctrl+left-click) on a data point, the nearest five geometrically neighboring points, based on Euclidean distance, will be highlighted with a color of your choice. This feature will be deactivated when the user right-clicks on the selected point again.

Your submission should contain a zip file with your code, instructions on running it if needed, and a short reflection on how you interpret the data with your implemented scatter plot.

Please prepare a ZIP archive with your implementation and a report (PDF) with your results, and upload it as a submission to Lisam by the given deadline! Also, do not forget to include screenshots of your scatter plot. If you have questions you can contact your lab assistant, Elias Elmquist (elias.elmquist@liu.se) for class A, or Peilin Yu (peilin.yu@liu.se) for class B.
You will have to present your work on Tuesday, Jan. 31st, from 13:15-15:00, K24 (Class A) and KO24 (Class B).
Note: Any kind of plagiarism is not acceptable!