Universität Stuttgart

Institut für Visualisierung
und Interaktive Systeme

Assignment 2

Information Visualization & Visual Analytics (WS 2019/20)

Due: Monday, 04.11.2019, 11:59 AM **Discussion:** Wednesday, 06.11.2019

Please solve the assignment in **groups of up to three (3) students**. Choose one student, who uploads your solution on the assignments page in ILIAS as PDF (for theoretical submissions) or ZIP (for practical submissions Impl). The submitted files should follow the naming scheme `yourlastname1_yourlastname2_yourlastname3` with respective file extension, of course. Make sure that you create your team before uploading the solution.

Task 1 Scales and Visual Mapping *[Points: 12]*

As a reminder: Quantitative scales can be further subdivided into "interval" and "ratio" scales. Data on a ratio scale has a meaningful, non-arbitrary zero, whereas on an interval scale it does not. Often times, a ratio scale can be described as specifying "how much" of something or "how many".

(a) *(1 point)* **Explain** where the terms "**interval**" and "**ratio**" might come from.

(b) *(4 points)* **Which** of the following scales are **interval**, **which** are **ratio** scales?
degree Celsius, degree Kelvin, dates, durations, Cartesian coordinates, weight, account balance, length

(c) *(3 points)* Color is an important visual primitive. Given data with nominal scale, ordinal scale, and quantitative scale, please **provide** a **suitable color mapping** of each type and **explain** your choice. Please use the following data examples.

- Persons: Max, Ben, Alice, Bob, Johanna, Tiffany, Andrea
- Grades: very good, satisfactory, good, sufficient, unsatisfactory, poor
- Degree Celsius: -3.5, +2.1, +13.5, +5.2, -0.0, -6.0, +22.7, +18.3

(d) *(4 points)* Subsequently, a *bar chart* and *pie chart* diagram are depicted in Figure 1. **Which visual variables** are used to represent the quantitative data? If you had the task to sort the values in increasing order, which diagram would you choose? **Explain** why the one is **better** and the other is **worse** based on the respective **visual variables**.

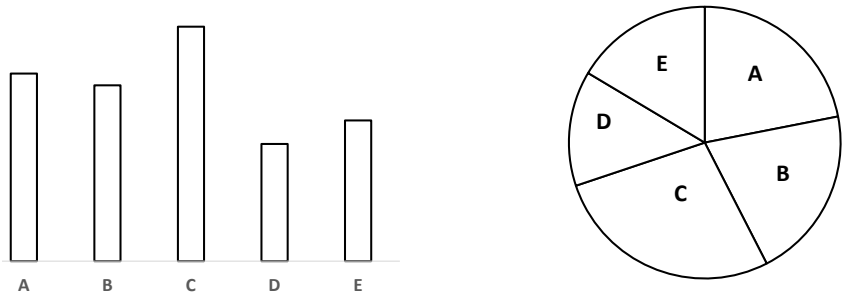

Figure 1: A *bar chart* and *pie chart* diagram that represent the same quantitative data.

Task 2 Storytelling *[Points: 8]*

Edward Segel and Jeffrey Heer [1] identified seven different genres of Narrative Visualization: magazine style, annotated chart, partitioned poster, flowchart, comic strip, slideshow, and video. In this exercise, you are asked to tell the story of Climate Change in a single visualization image. The visualization may incorporate a variety of media, including charts, pictures, text and can also be interactive. Visual variables such as color and shape can be used to link different parts of visualization together and provide an easy way of navigation.

Your visualization should draw the attention towards the seriousness of the climate change problem. By viewing the visualization, one should be able to understand why climate change is happening? what are the consequences? and how the problem could be avoided?

Comment on your visualization and evaluate it against the following three criteria[2]:

- **Comprehensibility:** Is the information presented in a clear, comprehensible way? Is the purpose easy to understand?
- **Likability:** Is the visualization interesting and engaging?
- **Navigability:** Is the visualization easy to navigate?

For this exercises, we provide below some data sources[3][4][5][6] where you can obtain information, pictures and charts about climate change problem. However, feel free to include materials from other sources if necessary. At any case, you should cite all materials you have included in your visualization. Please create hand-crafted or digital sketches. In the case of hand-crafted sketches, please scan in your results or take a picture of them. For digital sketches, you may use any programming language[7][8][9] or visualization software[10]. In the footnotes, we provide some visualization examples for inspiration. In this case please provide both screenshots or a PDF of the result and the source code. Be creative (but reasonable)!

[1] Segel, Edward, and Jeffrey Heer. "Narrative visualization: Telling stories with data." IEEE transactions on visualization and computer graphics 16.6 (2010): 1139-1148.

[2] Figueiras, Ana. "How to tell stories using visualization." Information Visualisation (IV), 2014 18th International Conference on. IEEE, 2014.

[3] `https://en.wikipedia.org/wiki/Climate_change`

[4] `https://datahub.io/collections/climate-change`

[5] `https://en.wikipedia.org/wiki/Effects_of_global_warming`

[6] `http://www.oecd.org/statistics/climate-change-consequences-of-inaction.htm`

[7] `https://shiny.rstudio.com/gallery/`

[8] `https://dash-gallery.plotly.host/Portal/`

[9] `https://observablehq.com/collection/@observablehq/visualization`

[10] `https://public.tableau.com/en-gb/gallery/?tab=viz-of-the-day&type=viz-of-the-day`