



Assignment 12

Information Visualization & Visual Analytics (WS 2019/20)

Due: Monday, 03.02.2020, 12:00 **Discussion:** Wednesday, 05.02.2020

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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-ending, of course. Make sure that you create your team before uploading the solution.

Please post general questions regarding the exercise, but *no solutions*, to the forum. In case of more specific problems, especially such that cannot be posed outside of the context of your own solution, please send an email to, or make an appointment with, the tutor responsible for the exercise.

Task 1 Time Visualization [*Points: 9*]

There are two fundamental ways time can be encoded into a visualization: time-to-time, where change over time is shown as an animation; and time-to-space, where time is encoded in a spacial dimension.

- (a) (*2 points*) Give one concrete example for time-to-time mapping. How could a viewer of the visualization interact with the temporal dimension of the data in this example?
- (b) (*3 points*) Give one concrete example for time-to-space mapping. How, exactly, is time encoded here? How could a viewer of the visualization interact with the temporal dimension of the data in this example?
- (c) (*2 points*) What strengths and weaknesses do you see with time-to-time mapping? Discuss.
- (d) (*2 points*) What strengths and weaknesses do you see with time-to-space mapping? Discuss. For this part, consider only 2D visualizations¹.

Task 2 Research: Horizon Graphs [*Points: 8*]

In this task, you will do some academical research, as you would, for example, when writing your theses. For this research, multiple academic search engines are available, such as (1) Google Scholar, (2) Microsoft Academic, or (3) CiteSeer. Through your affiliation with the University of Stuttgart, papers published through many major publishers such as IEEE or ACM are available to you for free. To make use of that, you will need to browse from within the university network, or using a VPN connection to it.

Before answering the questions below, read the 2009 paper “Sizing the Horizon: The Effects of Chart Size and Layering on the Graphical Perception of Time Series Visualizations” by Heer, Kong, and Agrawala [1].

- (a) (*2 points*) In your own words, summarize the paper in two to three sentences.
- (b) (*1 points*) The authors discuss the so-called “*horizon graph*”. How is this graph/plot constructed, and what does it show?
- (c) (*2 points*) Name one strength and one weakness of the technique.
- (d) (*3 points*) Describe the evaluation setup the authors used. Which hypotheses did they test? How many test subjects did they use for their experiments, and how conclusive were the results? What were their conclusions?

¹i.e., no space-time-cube!

- (e) (*5 points (bonus)*) When researching related work in academia, one method is forward search based on a given work. This method entails looking at papers published later that cite the starting point paper.

Using an academic search engine, find a paper published in the last two years (i.e., 2017 or later) that cites the work by Heer, Kong, and Agrawala [1] *and* has been cited by later work already (indicating that it is in some sense important). Properly cite the paper and summarize it in two to three sentences. Further specify why/in which context this paper cites the work by Heer, Kong, and Agrawala [1].

References

- [1] Jeffrey Heer, Nicholas Kong, and Maneesh Agrawala. “Sizing the Horizon: The Effects of Chart Size and Layering on the Graphical Perception of Time Series Visualizations”. In: *Proc. SIGCHI Conference on Human Factors in Computing Systems*. Boston, MA, USA: ACM, 2009, pp. 1303–1312. ISBN: 978-1-60558-246-7. DOI: 10.1145/1518701.1518897.