

Summary of "Challenges and Unsolved Problems"

Giorgio Conte

1 SUMMARY

This article lists and describes a list of unsolved problems and challenges that are still open problems in the visualization field. The author cluster those challenges in three main categories: Human-Centered Challenges, Technical challenges and Financial challenges. The most interesting category, in my opinion, is the first group, since it represents some abstract ideas and problems that must be solved from a theoretically point of view and are not linked to the technology that we have right now. The challenge that caught my attention was the one about the "interdisciplinary collaboration". The authors claim and highlight how difficult is to collaborate with other people and how collaboration is at the base of visualization. In fact, in the vast majority of the case, visualization researchers must communicate with other practitioners in other disciplines. This operation is not as simple as it might seem and also in [1] this concept is highlighted and considered a key point in visualization research. Understand the need of others practitioner is at the base of a good visualization project.

The other challenge presented in this paper that impressed me is the one about the choice of "optimal levels of visual abstraction." Especially when the size of the data set we are visualizing is quite big, it is necessary to find the right level, or levels, of abstraction. As well as before, this is a crucial aspect. On the one hand, "the higher the level of abstraction, the more difficult cognition and interpretation can be", on the other it is not possible to map each item into the visualisation. Some users want an high level of abstraction, other prefer a direct representation of the data set.

Another interesting challenge proposed in the paper is the one about how to represent the quality of data. Datasets are becoming bigger and bigger, but the quality of the data collected

not always is as good as the size of dataset. Very often the visualisation should deal with missing data, and data which by themselves are not precise and suffer from a natural error. Sometimes the error can be ignored, but many times data must be treated and for this purpose data are preprocessed or smoothed before they are visualised. This activity has a great influence on the visualisation.

The second and the third part of the article talk about technical and financial challenges. The second part, in my opinion, has a minor importance with regard to the visualisation problem. In fact, technology is changing very quickly in these days and could be solved and overcome easily. The authors list in this category the challenge about how to deal with high data dimensionality and time-dependent data, which, in my opinion, should have been listed in the group described before. In fact, representing these kinds of data is difficult not because the technology is not powerful enough, but because human perception is limited to 3/4 dimensions. Finding a good representation of high-dimensional data is an intrinsic problem and it does not depend on the technology.

At the same time, how to evaluate the value of a visualisation is quite hard. In particular, introducing standard measurements is quite tough because of the wide range in which visualisation research is acting. In which kind of visualisation should people invest? As the authors report, this topic is quite novel and it has been first addressed by Jarke van Wijk in [2]. Van Wijk proposed some metrics to use in evaluating the cost of a visualisation. Of course, from this point of view there is room for improvement and refinement.

To sum up, the article is very interesting because it collects all the major challenges that have to be solved and on which the visualisation community is debating. The authors put together many ideas and the result is a complete review of the state of the art in many subtopics of visualisation research.

REFERENCES

- [1] Ben Shneiderman. Creativity support tools: accelerating discovery and innovation. *Communications of the ACM*, 50(12):20–32, 2007.
- [2] Jarke J Van Wijk. The value of visualization. In *Visualization, 2005. VIS 05. IEEE*, pages 79–86. IEEE, 2005.