UNIVERSITY OF ILLINOIS AT CHICAGO
DEPARTMENT OF COMPUTER SCIENCE
CS 524

Summary of "A Nested Model for Visualization Design and Validation"

Giorgio Conte

1 SUMMARY

The paper written by Tamara Munzner presents and describes a four-layers model for visualization design and validation. The entire process is split in four main operations in which each of them focuses its attention on very specific goal. Being able to address one specific subproblem at a time helps researchers to come up with targeted solutions. In fact, the author follows the idea that using well-defined design method is fundamental during the development process of new visualization projects. The main advantage people should have using this model is that each step is strictly related to a validation and verification step. Validation and verification are terms borrowed form software engineering and they refer to two different goals. The goal of validation is to show that what has been done is the right product, while the goal of verification is to show the work is right.
More in details, the author claims their model could help to avoid the main threats categories:

- wrong problem
- wrong abstraction
- wrong encoding/interaction
- wrong algorithm

Each of these threats are embedded and limited in one of the four-level model proposed. They are as follows:

- domain problem characterization
- data/operation abstraction design
- encoding/interaction technique design
- algorithm design

During the first part of the process, it is crucial to understand the domain in which we are working on and characterize the target we are addressing. In this step the major threat is to shape the wrong problem, while the two validation methods are as follows: observing and interviewing target users and, at the end, observe adoption rates.
In the second step of the model, the raw data should be encapsulated in computer science data types. In this phase both a translation and an abstraction processes are required. Very frequently, according to the author, the abstraction is done implicitly without any justification and this causes bad results and unclear choices.
In the third nested level, the data type should be linked and coupled to interaction and visual encoding technique. In my opinion, this part lack of some details. In fact, it is not clear in which way is possible to achieve this goal. Only the threats are very well listed and described.
To sum up, to reach a good visualization result, the main validation technique is to have feedback from the targeted users. Discussing the visualization is the most effective way to avoid the biggest treat hidden at this label, namely not creating a valuable product at communicating "the desired abstraction to the person using the system".
The innermost level is aimed at developing the algorithm. Here, having a suboptimal algorithm in terms of space or memory is the main issue people could go into. Another hidden threat is the correctness of the algorithm but it could be proved sometimes using some images or video produced.
After some examples reinterpreted using the model proposed, the author gives some recommendations on how to write a good paper. In details, the author suggests to distinguish among the various levels at which the own contribution could be apported. Moreover, very often the contribution is focused only at one level, so it is necessary to state and report clearly the assumptions that have been done at the other different levels. Doing this the reader will understand better which the new steps done are and on what basis the contribution has been built.
As the author underlines at the end of the paper, the model proposed in not comprehensive and it is not the only approach that could be followed to create a research paper. However, this represents a very good guidance to follow when working on a new research project.