A Visualization Authoring Model for Post-WIMP Interfaces

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Motivation and Basic Idea
For novel visualization environments beyond the desktop (e.g., immersive analytics environments), the process of authoring visualizations is often decoupled from the place where the visualization is actually used. This can hinder authors, developers, or users from understanding what consequences different choices they made will have while creating visualizations. We present an extended visualization authoring model for Post-WIMP interfaces, which support designers by a more seamless approach of developing and utilizing visualizations.

Visualization Authoring Model
Built upon the existing models, we emphasize the iterative nature of creating and configuring, the existence of multiple views in the same system, and diverse user requirements for the data analysis process.

Starting from the Visualization Construction Cycle (VCC), users can either select data attributes (DAS) or choose a visualization type (VTS) to visualize. Next they can select and define different aspects of a visualization (VMS) like the visual encoding.

As a result, the visualization (V) is produced as an output. Later, the user can perform further view transformation (VT), like panning and zooming.

An iterative process is supported so that users can reconfigure the different parts of the Visualization Construction Cycle (VCC).

To construct an alternative look of this view (VA), a new visualization based on the already existing one can be created. In addition, the visualization can be used as a basis for further exploration, like drill down (DD). Both mentioned methods use an existing visualization as a template (TV) to predefined different values.

Lastly, as the data analysis process often involves multiple visualizations, which makes it necessary to allow for different layout management (LM) behaviors to structure the presentation of arbitrary groups of visualization and help with the sensemaking process.

Possible Application
To demonstrate how such a model can be used to implement and design future Post-WIMP Interfaces, we started with the development of our own prototype. Our immersive authoring tool (using the Hololens 2) makes use of a combination of a mobile device and a motion tracking system to enable users a spatial, tangible, as well as a a well-known interaction set. The shown visualizations are created by using the visualization framework u2vis (github.com/imldresden/u2vis).

Future Work
We will continue to use our model for upcoming research projects, which results in the following work packages:

- Further design and implementation of the early AR authoring prototype.
- Apply and verify our model in various application scenarios, particularly for novel post-WIMP applications.
- Further enhance and extend our model based on the insights generated through the previous points.

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