Engineering Insightful Visualizations

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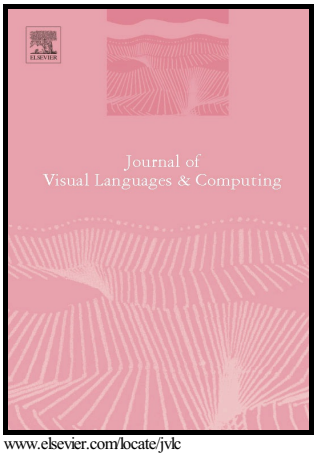

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Abstract

A theoretical visualization model that is suitable for a guideline based engineering approach as well as generically and widely applicable to visualization and its subfields is developed in this work. It is based on investigating question-answer pairs and emphasizes understanding and knowledge acquisition achieved via insight and learning but which is impeded by confusion brought on by in-appropriateness, incoherence, anacolutha and non-sequiturs. These terms are technically defined within the model. A visualization metric is developed that relates insight, learning and confusion with characteristics of how much and how fast understanding and knowledge are acquired. The model entails two connected processes: a visualization process based on visualization media componentization followed by a human process consisting of perception, interpretation, understanding and knowledge acquisition. Several case studies drawn from the various subfields of visualization show the potential of the proposed model.

Keywords: Scientific; Information; Infographics; Visualization; Understanding; Insight

1. Introduction

Many works have suggested that insight is the goal of visualization. As early as 1999, Card et al. [6] indicated insight as the purpose of visualization in the context of information visualization. Whereas, the panel discussion at IEEE VIS 2005 focused on "... the process of transforming data into

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