Proposal Defense
Doctor of Philosophy in Computer Science

“Leveraging Interactive User Feedback for Personalized Data Visualization Recommendation" by Xiaozhong Zhang

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Committee:
- Panos K. Chrysanthis, Professor, Department of Computer Science, University of Pittsburgh
- Adriana Kovashka, Assistant Professor, Department of Computer Science, University of Pittsburgh
- Alexandros Labrinidis, Professor and Chair, Department of Computer Science, University of Pittsburgh
- Mohamed A. Sharaf, Associate Professor, Department of Computer Science, United Arab Emirates University

Abstract: Data visualization (i.e., view) is a powerful tool to communicate information clearly and efficiently, and is widely used in data analysis to support data-driven decision making. In order to provide view recommendation, a variety of utility functions have been proposed to estimate the utility (e.g., usefulness or interestingness) of the views. Different utility functions assess different aspects of the view utility, such as visual quality, pattern peculiarity, and multiple utility functions can be combined to form a multi-objective utility function. Selecting a good utility function that can generate visualization that is both easy to understand and useful is not a trivial task, because the search space of visualization configurations (e.g., variables to visualize, data transformations, visual encodings) is prohibitively large.

Furthermore, the utility functions in traditional view recommendation works typically do not consider user factors such as utility function preference or user expectation, leading to suboptimal recommendation. For example, different users may have different preferences over the utility functions, such that a predefined utility function is not likely to fit all users at all times. User expectation also plays a role in view utility. For example, if a peculiar pattern is expected by the user, then they will not find it very interesting. To support personalized view recommendation, in this work, we propose a new paradigm, called Interactive View Recommendation (IVR), in which the system interactively elicits user factor information to select and tune utility functions.

An IVR system has two main objectives: high recommendation quality and low user interaction effort. However, these two objectives are usually in conflict, making the IVR problem even more challenging than traditional view recommendations. In this thesis, we propose ViewSeeker, an active learning-based IVR framework, which intelligently selects the most informative questions for user feedback to achieve a satisfactory recommendation quality while minimizing user interaction effort. ViewSeeker has three main functionalities: (1) utility function preference learning; (2) user expectation learning; and (3) external knowledge base utilization. Simulated and real user studies will be conducted to evaluate ViewSeeker’s effectiveness in leveraging interactive user feedback for personalized view recommendation.