Preface

From May 28 to June 1, 2007, a seminar on "Information Visualization – Human-Centered Issues in Visual Representation, Interaction, and Evaluation" (♯07221) took place at the International Conference and Research Center for Computer Science, Dagstuhl Castle, Germany. The center was initiated by the German government to promote informatics research at an international level. It seeks to foster dialog among the computer science research community, advance academic education and professional development, and transfer knowledge between academia and industry.

The primary feature of Dagstuhl is its series of week-long seminars on various topics in computer science. Dagstuhl seminars are frequently described as being the most productive academic events that the participant researchers have ever experienced. The informal and friendly atmosphere fostered at the center promotes personal interaction between the guests. Traditionally, there is no set program followed at Dagstuhl seminars. Instead, the pace and the procedure are determined by the presentations offered during the seminar and the discussion results. Further general information about Dagstuhl seminars can be found on the Dagstuhl Castle webpage[1].

Information visualization (InfoVis) is a relatively new research area, which focuses on the use of visualization techniques to help people understand and analyze data. While related fields such as scientific visualization involve the presentation of data that has some physical or geometric correspondence, information visualization centers on abstract information without such correspondences, i.e., information that cannot be mapped into the physical world in most cases. Examples of such abstract data are symbolic, tabular, networked, hierarchical, or textual information sources. The ever increasing amount of data generated or made available every day amplifies the urgent need for InfoVis tools. To give visualization a firm fundament, InfoVis combines several aspects of different research areas, such as scientific visualization, human-computer interaction, data mining, information design, cognitive psychology, visual perception, cartography, graph drawing, and computer graphics.

One main goal of our seminar on information visualization was to bring together researchers and practitioners from the above-mentioned research areas as well as from application areas, such as bioinformatics, finance, the geosciences, software engineering, and telecommunications. Several international conferences include information visualization topics, each with a slightly different high-level objective. Another goal of the Dagstuhl seminar was to consolidate these diverse areas in one joint meeting. The seminar allowed critical reflection on actual research efforts, the state of the field, evaluation challenges, and future directions. A detailed report on participation, program, and discussions was published in the journal *Information Visualization*, published by Palgrave Macmillan Ltd. (6(3):189-196, 2007).

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[1] `http://www.dagstuhl.de/en/about-dagstuhl/`

This book is the outcome of Dagstuhl Seminar ♯07221. It documents and extends the findings and discussions of the various sessions in detail. During the last day of the seminar, the most important topics for publication were identified and assigned to those interested. The resulting author groups worked together to write papers on the chosen topics. In the following, we briefly present the different papers.

Book Structure

Paper 1 "The Value of Information Visualization", provides a discussion of issues surrounding the utility and benefits of InfoVis. The paper identifies why communicating the value of InfoVis is more difficult than in many other areas, and it provides a number of arguments and examples that help to illustrate InfoVis' value.

Paper 2 "Evaluating Information Visualizations", discusses the challenges associated with the evaluation of InfoVis tools and approaches. Different types of evaluation are described as well as the advantages and disadvantages of different empirical methodologies.

Paper 3 "Theoretical Foundations of Information Visualization", addresses an important issue: InfoVis, being related to many other diverse disciplines, suffers from not being based on a clear underlying theory. Drawing on theories within associated disciplines, three different approaches to theoretical foundations of information visualization are presented: data-centric predictive theory, information theory, and scientific modeling.

Paper 4 "Teaching Information Visualization", presents the results of a survey about InfoVis-related courses that was distributed to the Dagstuhl attendees during the seminar. It also summarizes the discussions about teaching held by the attendees during a special session on that topic. The paper includes the perspectives of three seminar participants in relation to their own InfoVis-related teaching experiences.

Paper 5 "Creation and Collaboration: Engaging New Audiences for Information Visualization", discusses creation and collaboration tools for interactive visualization. The paper characterizes the increasingly diverse audience for visualization technology, and it formulates a design space for new creative and collaborative tools to support these users.

Paper 6 "Process and Pitfalls in Writing Information Visualization Research Papers", identifies a set of pitfalls and problems that recur in many InfoVis-related papers, using a chronological model of the research process. The aim of this paper is to help authors avoid these pitfalls and write better papers. Reviewers might also find these pitfalls interesting to consider when evaluating the merits of a paper.

Paper 7 "Visual Analytics: Definition, Process, and Challenges", describes the related and growing field of visual analytics. The paper explains the perceived difference between visual analytics and InfoVis, and it identifies the technical challenges faced by visual analytics researchers. The paper concludes by describing a number of visual analytics applications.

Acknowledgments

We would like to thank all those who participated in the seminar for the lively discussions as well as the scientific directorate of Dagstuhl Castle for giving us the opportunity to organize this event. The abstracts and talks can be found on the Dagstuhl website for this seminar[2]. In addition, we are also grateful to all the authors for their valuable time and contributions to the book. Last but not least, the seminar would not have been possible without the great help of the staff of Dagstuhl Castle. We would like to thank all of them for their assistance.

March 2008   Andreas Kerren
                                                              John T. Stasko
                                                         Jean-Daniel Fekete
                                                                Chris North

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[2] http://www.dagstuhl.de/07221