

Personal Visualization and Personal Visual Analytics

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For each and every one of us, big data impinges on our personal and professional lives. This includes a whole host of variations such as our social networks, our expanding photo collections, and our efforts to become more green. However, the development of visualization and visual analytics tools has focused on data important to science, business, and government.

Nevertheless, individuals have begun exploring how they can understand the data that affects them in their personal lives, often using the social fabric of the Web as a medium. Working with and understanding data is always a challenge, and in this regard, data arising from personal life is no different. Yet personal data brings a new context to both visualization and visual analytics, and with that new context comes new research and design challenges.

This special issue gathers six research articles that explore personal visualization and analytics, showing the range and diversity of topics. The articles in this issue illustrate that personal visualization and analytics offer substantial opportunities to help individuals gain insight and knowledge about themselves and their communities, ranging from health and fitness information, to energy consumption, to records of their interactions with others through social media.

Yet, designing tools to support visualization and analysis of data in one's nonprofessional life brings a unique set of research and design challenges. How can the power of visualization and visual analytics be made appropriate for use in personal contexts? People who want to use these tools might have little experience with data, visualization, or statistical reasoning. They might need to access

their data fleetingly and quickly, perhaps on a mobile device in a noisy public setting such as a bus or train. They might also be more interested in being inspired and engaged by their data than completing a functional task quickly and accurately.

Personal visualization (PV) explores the visualization challenges pertaining to data in personal contexts. That is, it involves empowering people with improved access to and comprehension of their own data through the use of interactive visualizations. *Personal visual analytics* (PVA) is the incorporation of analytical reasoning with personal visual representations as appropriate for use within a personal context. PV and PVA extend visualization and visual analytics to the personal domain with the goal of empowering individuals in their everyday lives, helping them to develop insights and discover knowledge relevant to themselves, their relationships, and their communities. Personal context implies a nonprofessional situation, where people may have different goals, priorities, role expectations, environments, or time and resource budgets than in professional aspects of their lives. Because of these differences, PV and PVA designs necessarily have new requirements and challenges that bring with them new research opportunities.

The articles in this theme issue focus on the unique challenges of designing visualization and visual analytic tools for use in a personal context. From a total of 17 submissions, we selected six representative articles that range from pre-design studies to deployed prototypes. The articles focus on a range of applications, including quantified self presentations, personal note-taking, home energy consumption, and sports data collection.

Eun Kyoung Choe, Bongshin Lee, and m.c. schraefel's article "Characterizing Visualization Insights from Quantified Selfers' Personal Data Presentations" takes a closer look at one of the origins of this research. This work provides an initial basis of insight types relevant to personal contexts: details, self-reflection, trends, comparisons, correlations, data summaries, distributions, and outliers. Most of these, with the exception of self-reflection, look familiar to traditional visualization. This study affirms that, although visualization has much to offer personal data and in personal contexts, there are new factors worthy of consideration.

In "Understanding Digital Note-Taking Practice for Visualization," Wesley Willett, Pascal Goffin, and Petra Isenberg study personal digital note-taking practices. They discuss how this act of essential personal data creation—sketching, ideation, and experimenting—offers new opportunities for applying visualization and analytic techniques. Their implications for visualization include summarization, visualizing relationships, improved methods for sharing among collaborators, and supporting personal recall and reflection.

Lyn Bartram summarizes insights from her ongoing research into informing people about energy usage in their own homes in her article "Design Challenges and Opportunities for Eco-Feedback in the Home." The challenges in designing effective informative homes she notes include cognitive factors such as the need for new models of how to think about data as well as scope, social factors, and scale; psychological factors that consider variations in engagement and motivation; and effort factors such as how much work or effort is reasonable as part of one's nonprofessional life. These challenges may prove relevant to a wider range of personal contexts.

In "Eye Tracking for Personal Visual Analytics," Kuno Kurzhals and Daniel Weiskopf investigate the applicability of eye tracking to examining personal encounters. Their area of interest (AOI) cloud makes it possible to consider one's distribution of visual attention directed toward other people and the interpersonal factors that are involved. Although this exploration does raise issues of personal privacy, it is oriented to future possibilities of appropriate attention-tracking technology.

Jo Wood explores a sports cycling case study that is particularly appropriate in a personal context because so many people are attempting to use personal data to improve their athletic performance. In "Visualizing Personal Progress in Participatory Sports Cycling Events," Wood argues that in this

personal context it is important to represent the aspects of participation that evoke emotional response, suggesting that an emotional connection to the data is a particularly important characteristic of personal visualization.

Lastly, Shimin Wang, Yuzuru Tanahashi, Nick Leaf, and Kwan-Liu Ma's article "Design and Effects of Personal Visualizations" explores three personal visualization designs and, through qualitative observations, notes interesting differences in participant responses. The most traditional visualization was easiest to interpret and the most effective in providing detailed information, but it was also the least helpful for recall. The other two visualizations, although less easy to interpret, stimulated much more interest and exploration. This observation raises conjectures about how design criteria for personal visualization may differ from traditional visualization.

These explorations of PV and PVA have considered a range of both personal data types and personal contexts. We hope that this diversity will illustrate research possibilities in this area and inspire future exploration. We believe this collection only scratches the surface of visualization research that can help to empower us as individuals. The knowledge gained in the research community through the application of science, business, and government data should prove useful in personal contexts. However, more importantly, these explorations in personal contexts are already revealing new challenges, such as the importance of recall and self-reflection, that will in turn inform visualization more broadly. ❖

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