Preface

Time is an exceptional dimension. We recognize this every day: when we are waiting for a train, time seems to run at a snail's pace, but the hours we spend in a bar with a good friend pass by so quickly. There are times when one can wait endlessly for something to happen, and there are times when one is overwhelmed by events occurring in quick succession. Or it can happen that the weather forecast has predicted a nice and sunny summer day, but our barbecue has to be canceled due to a sudden heavy thunderstorm. Our perception of the world around us and our understanding of relations and models that drive our everyday life are profoundly dependent on the notion of time.

As visualization researchers, we are intrigued by the question of how this important dimension can be represented visually in order to help people understand the temporal trends, correlations, and patterns that lie hidden in data. Most data are related to a temporal context; time is often inherent in the space in which the data have been collected or in the model with which the data have been generated. Seen from the data perspective, the importance of time is reflected in established self-contained research fields around temporal databases or temporal data mining. However, there is no such sub-field in visualization, although generating expressive visual representations of time-oriented data is hardly possible without appropriately accounting for the dimension of time.

When we first met, we had all already collected experience in visualizing time and time-oriented data, be it from participating in corresponding research projects or from developing visualization techniques and software tools. And the literature had already included a number of research papers on this topic at that time. Yet despite our experience and the many papers written, we recognized quite early in our collaboration that neither we nor the literature spoke a common (scientific) language. So there was a need for a systematic and structured view of this important aspect of visualization.

We present such a view in this book – for scientists conducting related research as well as for practitioners seeking information on how their time-oriented data can be visualized in order to achieve the bigger goal of understanding the data and gaining valuable insights. We arrived at the systematic view upon which this book is based

in the course of many discussions, and we admit that agreeing on it was not such an easy process. Naturally, there is still room for arguments to be made and for extensions of the view to be proposed. Nonetheless, we think that we have managed to lay the structural foundation of this area.

The practitioner will hopefully find the many examples that we give throughout the book useful. On top of this, the book offers a substantial survey of visualization techniques for time and time-oriented data. Our goal was to provide a review of existing work structured along the lines of our systematic view for easy visual reference. Each technique in the survey is accompanied by a short description, a visual impression of the technique, and corresponding categorization tags. But visual representations of time and time-oriented data are not an invention of the computer age. In fact, they have ancient roots, which will also be showcased in this book. A discussion of the closely related aspects of user interaction with visual representations and analytical methods for time-oriented data rounds off the book.

We now invite you to join us on a journey through time – or more specifically on a journey into the visual world of time and time-oriented data.

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