

# Exploring Big Data using Visual Analytics

Daniel A. Keim  
Department of Computer and Information Science, University of Konstanz  
Daniel.Keim@uni-konstanz.de

## Abstract

Never before in history data is generated and collected at such high volumes as it is today. For the exploration of large data sets to be effective, it is important to include the human in the data exploration process and combine the flexibility, creativity, and general knowledge of the human with the enormous storage capacity and the computational power of today's computers. Visual Analytics helps to deal with the flood of information by integrating the human in the data analysis process, applying its perceptual abilities to the large data sets. Presenting data in an interactive, graphical form often fosters new insights, encouraging the formation and validation of new hypotheses for better problem-solving and gaining deeper domain knowledge. Visual analytics techniques have proven to be of high value in exploratory data analysis. They are especially powerful for the first steps of the data exploration process, namely understanding the data and generating hypotheses about the data, but they also significantly contribute to the actual knowledge discovery by guiding the search using visual feedback.

In putting visual analysis to work on big data, it is not obvious what can be done by automated analysis and what should be done by interactive visual methods. In dealing with massive data, the use of automated methods is mandatory - and for some problems it may be sufficient to only use fully automated analysis methods, but there is also a wide range of problems where the use of interactive visual methods is necessary. The presentation discusses when it is useful to combine visualization and analytics techniques and it will also discuss the options how to combine techniques from both areas. Examples from a wide range of application areas illustrate the benefits of visual analytics techniques.

## Short Bio

DANIEL A. KEIM is professor and head of the Information Visualization and Data Analysis Research Group in the Computer Science Department of the University of Konstanz, Germany. He has been actively involved in data analysis and information visualization research for about 20 years and developed a number of novel visual analysis techniques for very large data sets. He has been program co-chair of the IEEE InfoVis and IEEE VAST as well as the ACM SIGKDD conference, and he is member of the IEEE VAST as well as EuroVis steering committees. Dr. Keim got his Ph.D. and habilitation degrees in computer science from the University of Munich. Before joining the University of Konstanz, Dr. Keim was associate professor at the University of Halle, Germany and Senior Technology Consultant at AT&T Shannon Research Labs, NJ, USA.