Book Reviews

Atlas of Science: Visualizing What We Know

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Atlas of Science: Visualizing What We Know. Katy Börner. Cambridge, MA: MIT Press, 2010. 288 pp., 500 color illus. ISBN: 978-0-262-01445-8

Atlas of Science is a splendid display of successful mapping techniques; it is an introduction to the world of today's scientific analysis; it features more than 30 full-page science maps and many more interesting graphics; and as the author put it: "Science maps show us the landscape of what we know." Dr. Katy Börner is a Victor H. Yngve Professor of Information Science, Adjunct Professor of Informatics, Core Faculty of Cognitive Science, and Research Affiliate of the Biocomplexity Institute at the School of Library and Information Science, Indiana University, Bloomington. She holds a Ph.D. in Computer Science from the University of Kaiserslautern, and a Master of Engineering in Electronics degree from the University of Technology, Leipzig. The author of numerous research publications, her areas of expertise include scientometrics, knowledge management, information visualization, and data mining & modeling.

Scientific visualization is a new technical field. Based on a search done in Compendex, the first time the term visualization was used in the engineering literature was in 1949; the article cited reports about an experiment in flow visualization. Scarcely used in the following years, it finally reached over 100 citations in 1994. Since then, the number of documents in the database has consistently grown, and by early January of 2010, visualization as a 'control term' in Compendex had been reported 26,208 times. Unfortunately, scientific visualization is not a 'control term' yet, but it has a total of 3,900 entries. According to Johnson (2004), scientific visualization is a relatively new discipline, it was only recognized officially by the National Science Foundation in 1987 with the report: *Visualization in Scientific Computing*.

Bonneau, Ertl, and Nielson (2006) define scientific visualization as the branch of technology "concerned with techniques that allow scientists and engineers to extract knowledge from the results of simulation and computations." The tremendous amount of data obtained from modern sophisticated computing techniques and the information available to analyze this data, require a method of communicating where images, the human vision and perceptual psychology are utilized. Scientific visualization is a technology based on multiple areas including computer graphics, computer vision, perceptual psychology, applied mathematics and many others.

This is a delightful and wonderful book. It is divided into five parts containing 33 main sections and many subsections. It has more than 500 images, graphics, diagrams, maps, and tables. All of them represent interesting examples about how scientific visualization is used, many are in attractive colors and with excellent resolution. The size of the book, 13 1/4 by 11 1/4 allows for what scientific visualization is all about: presenting a lot of well organized information to the human eyes. This book is also an accompanying resource for the open access online exhibit *Places & Spaces: Mapping Science*.

It starts with an introduction to the topic: the importance of access to data and knowledge, the relationship between the creation of documents (books, journals, etc.) and the real growth of scientific and technological advances, a historical account of map making, and the introduction of scientometrics as a valid method to measure knowledge creation are some of the topics presented in chapter one. The next chapter, The History of Science Maps, is a chronological display of what in more recent years has been known as scientometrics. It goes back all the way to the Eighteenth Century when the interpreters of knowledge creation were using totally different approaches.

In chapter three, the author presents more advanced techniques for constructing visualization models. Chapter four, Science Maps in Action, is the most extensive part of this book. It provides a fantastic display of mapping images covering a wide spectrum of human endeavors. For example the reader will find a visualization of: DNA development; tectonic movements and earthquake hazards predictions; world oil production through the years; air travel and global spread of infectious diseases and many other interesting applications. The last chapter is a discussion and presentation on how this relatively new branch of technology would be utilized in the future.

This book and its complementary online exhibit are recommended as an educational source for getting a broader understanding of scientific visualization. The long list of references offers an excellent starting point for those interested in further reading on the historical perspective, the scientific foundation of the field, or specific applications. Access to the online exhibit provides the user with high-resolution graphics and easy ways to copy and edit bibliographic references of documents, and objects cited. This book is recommended for high school, academic, and large public libraries and it should be on the shelves of those interested in the connection between the graphic arts and the sciences.

References

Bonneau, G. P., Ertl, T., and Nielson, G. M., editors. 2006. *Scientific Visualization: The Visual Extraction of Knowledge from Data*. Berlin: Springer.

Johnson, C. 2004. Top scientific visualization research problems. *IEEE Computer Graphics and Applications*, 4(4): 13-17.