

Fall 2011: GEOG 780 – Knowledge Visualization

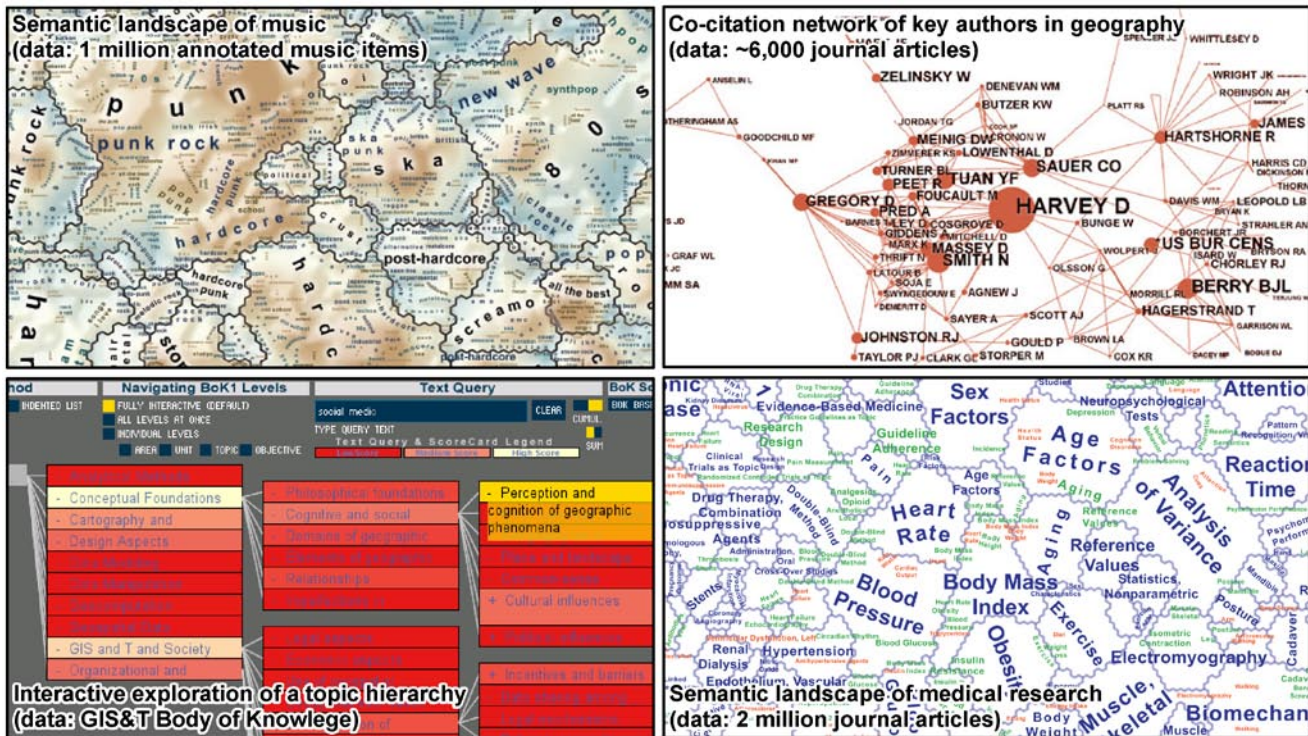
Dr. André Skupin

Department of Geography, Storm Hall 312

619- 594-6946

skupin@mail.sdsu.edu

<http://geography.sdsu.edu/People/Pages/skupin/>



Purpose of Course

Visualization has emerged as a key strategy for dealing with the flood of data generated in contemporary society. The topic addressed in this seminar deals with a particular sub-discipline of information visualization known as **knowledge visualization**. It deals with all types of human knowledge artifacts, including scientific papers, news articles, Web pages, social media tags, and others. In particular, knowledge visualization is meant to help us study those artifacts in an aggregated manner, so that hidden structures and relationships may be uncovered. This approach is seen as crucial in a growing number of domains, from social media analyses pursued in counter-terrorism efforts to the analysis of thousands of documents within the digital humanities.

This seminar will chart the current state and emerging future of knowledge visualization, based on a discussion of contemporary trends, evolving techniques, and real-world applications. The seminar will specifically address several distinct data types and the different means for handling them, including **vector spaces** (e.g., the content of text documents) and **network spaces** (e.g., social media networks, citation networks).

Students will be participating in hands-on projects with the goal of authoring usable visualizations. Through the readings, classroom discussion, and practical work, students will:

- 1) gain a significant understanding of the **concepts and techniques** driving knowledge visualization,
- 2) acquire **practical skills** in dealing with novel computational methods, and
- 3) develop scientific **discourse skills**.

This class requires only a commitment to active, participatory learning. An active interest in computational solutions is presumed, but in-depth programming expertise is NOT a requirement. We will be working with a

programming environment called *Processing* that was specifically designed to allow novice programmers to easily turn data into engaging, interactive visualizations (<http://www.processing.org/>). Students will also be working with standard tools for collaborative software development.

Readings

The following will be key readings for the course:

- Börner, K. (2010) *Atlas of Science: Visualizing What We Know*. Cambridge, MA: MIT Press.
- Fry, B. (2008) *Visualizing Data*. Sebastopol, CA: O'Reilly Media, Inc.
- Reas, C. and Fry, B. (2010) *Getting Started with Processing*. Sebastopol, CA: O'Reilly Media, Inc.
- Widdows, D. (2004) *Geometry and Meaning*. Stanford, CA: CSLI Publications, Center for the Study of Language and Information

Additional readings will be assigned throughout the semester.

Student Evaluation

Students will be evaluated based on the following criteria:

- **studio work** on a practical knowledge visualization project, including final report and presentation (50%)
- **discussion**, with students taking turns for weekly topics (25%)
- **active participation** throughout the seminar (25%)

About the Instructor

Dr. André Skupin has worked on various aspects of knowledge visualization for almost two decades, pioneering the adoption of geographic metaphors and cartographic techniques in the visualization of complex, high-dimensional data sets. His research has been strongly interdisciplinary, aimed at increased cross-fertilization between geography, information science, and computer science, and has been published in such diverse outlets as the *Journal of Visual Languages and Computing*, *Journal of Informetrics*, *IEEE Computer Graphics and Applications*, and the *Proceedings of the National Academy of Sciences*. He has co-edited one book and two special journal issues dealing with visualization. Dr. Skupin's research has in various forms been supported by the National Science Foundation, the White House Office of National Drug Control Policy, the Louisiana Board of Regents, and others, and has resulted in invited presentations at institutions as diverse as University College Dublin, Media X at Stanford University, the International Institute for Social History in Amsterdam, and the Paris IdF Complex Systems Institute.

Dr. Skupin currently serves on an advisory panel for the San Diego Association of Governments (SANDAG) and has served on the advisory board of the *Places & Spaces* project (<http://www.scimaps.org/>) since its inception. He is a partner within the World Resources Simulation Center (WRSC) and program director of the ESRI Development Center (EDC) at SDSU. Dr. Skupin has for several years been SDSU's lead delegate to a national organization of 70+ research universities, the University Consortium for Geographic Information Science (UCGIS), and previously served as Chair of its Membership Committee.