

CNS Data Science

Katy Börner

Cyberinfrastructure for Network Science Center
School of Informatics and Computing and
Indiana University Network Science Institute
Indiana University, USA



Indiana University

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CNS Tools and Services are used by
hundreds of thousands around the globe

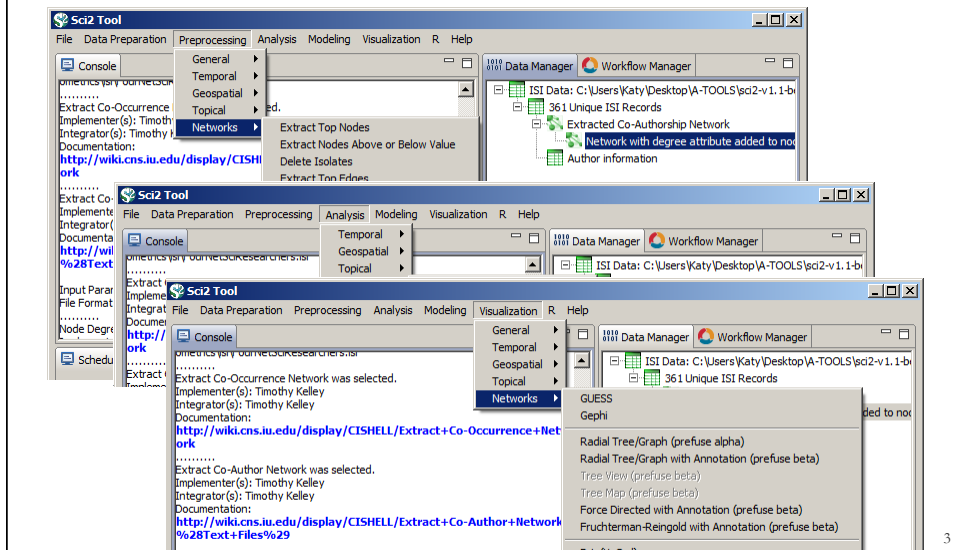


Our mission is to advance datasets, tools, and services for the study of biomedical, social and behavioral science, physics, and other networks. A specific focus is research on the structure and evolution of science and technology (S&T) and the communication of results via static and interactive maps of science. Learn more at cishell.org.



Sci2 Tool Interface Components

Download for free at <http://sci2.cns.iu.edu>



Load One File and Run Many Analyses and Visualizations

Times Cited	Publication Year	City of Publisher	Country	Journal Title (Full)	Title	Subject Category	Authors
12	2011	NEW YORK	USA	COMMUNICATIONS OF THE ACM	Plug-and-Play Macroscopes	Computer Science	Borner, K
18	2010	MALDEN	USA	CTS-CLINICAL AND TRANSLATIONAL SCIENCE	Advancing the Science of Team Science	Research & Experimental Medicine	Falk-Krzesinski, HJ Borner, K Contractor, N Fiore, SM Hall, KL Keyton, J Spring, B Stokols, D Trochim, W Uzzi, B
13	2010	WASHINGTON	USA	SCIENCE TRANSLATIONAL MEDICINE	A Multi-Level Systems Perspective for the Science of Team Science	Cell Biology Research & Experimental Medicine	Borner, K Contractor, N Falk-Krzesinski, HJ Fiore, SM Hall, KL Keyton, J Spring, B Stokols, D Trochim, W Uzzi, B

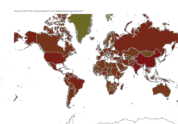
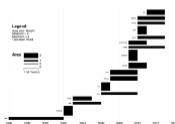
Statistical Analysis—p. 44

Temporal Burst Analysis—p. 48

Geospatial Analysis—p. 52

Geospatial Analysis—p. 52

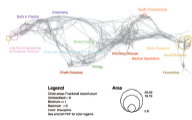
Location	Count	# Citations
Netherlands	13	292
United States	9	318
Germany	11	36
United Kingdom	1	2



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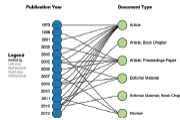
Topical Analysis—p. 56



Paper Citation Network—p. 60



Bi-Modal Network—p. 60

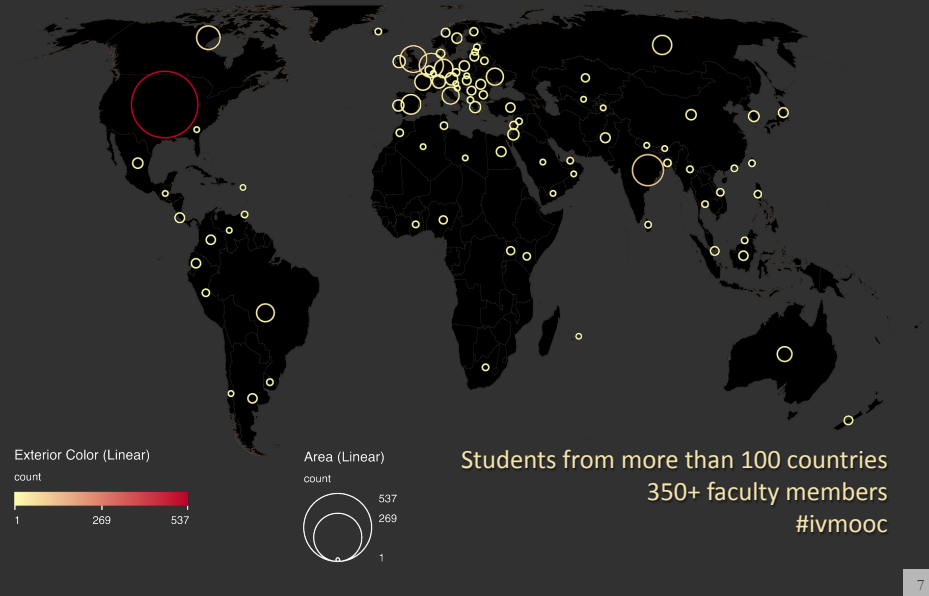


Co-author and many other bi-modal networks.



Register for free: <http://ivmooc.cns.iu.edu>. Class started Jan 12, 2016.

The Information Visualization MOOC
ivmooc.cns.iu.edu



Course Schedule

Part 1: Theory and Hands-On

- **Session 1** – Workflow Design and Visualization Framework
- **Session 2** – “When:” Temporal Data
- **Session 3** – “Where:” Geospatial Data
- **Session 4** – “What:” Topical Data

Mid-Term

- **Session 5** – “With Whom:” Trees
- **Session 6** – “With Whom:” Networks
- **Session 7** – Dynamic Visualizations and Deployment

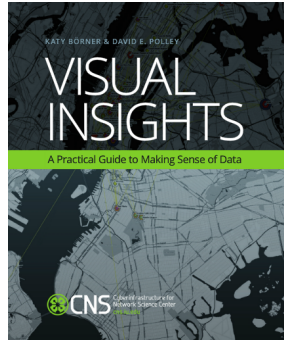
Final Exam

Part 2: Students work in teams on client projects.

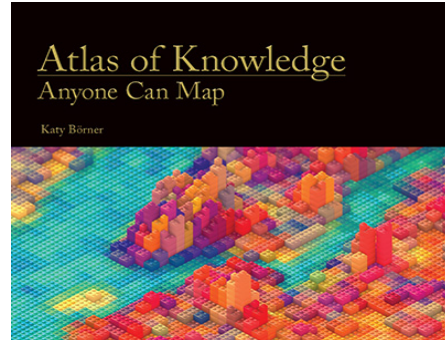
Final grade is based on Class Participation (10%), Midterm (30%), Final Exam (30%), and Client Project(30%).



Books Used in the IVMOOC



Teaches timely knowledge:
Advanced algorithms, tools, and hands-on workflows.



Teaches timeless knowledge:
Visualization framework—exemplified using generic visualization examples and pioneering visualizations.





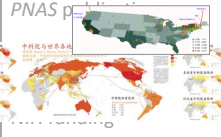



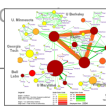

9

Type of Analysis vs. Level of Analysis

	Micro/Individual (1-100 records)	Meso/Local (101–10,000 records)	Macro/Global (10,000 < records)
Statistical Analysis/ Profiling	Individual person and their expertise profiles	Larger labs, centers, universities, research domains, or states	All of NSF, all of USA, all of science.
Temporal Analysis (When)	Funding portfolio of one individual	Mapping topic bursts in 20 years of <i>PNAS</i>	113 years of physics research
Geospatial Analysis (Where)	Career trajectory of one individual	Mapping a state's intellectual landscape	<i>PNAS</i> publications
Topical Analysis (What)	Base knowledge from which one grant draws.	Knowledge flows in chemistry research	VxOrd/Topic maps of NIH funding
Network Analysis (With Whom?)	NSF Co-PI network of one individual	Co-author network	NIH's core competency

10

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Geospatial Analysis (Where)	Career trajectory of one individual	Wrapping a s intellectual k 	PNAS p 
Topical Analysis (What)		Knowledge flows in chemistry research	
Network Analysis (With Whom?)	NSF work of one 	NIH's 	NIH's 

11

Current Projects

- Measuring and Visualizing STEM Pathways. NCSE-1538763 Award (Adam V. Maltese, Katy Börner) Aug. 15, 2015 - Jan. 2017.
- Mapping Scientific Growth and Impact of Major IU-based Research Programs in Alzheimer's Disease. CTSI-PDT Award (Li Shen & Andrew J. Saykin, Dept. of Radiology & Imaging Sciences, IU School of Medicine, Katy Börner) 2 years.
- XDMoD Value Analytics. NSF EAGER Award (Matthew Link, Katy Börner, Robert Henschel) 18 months.
- Network for Computational Nanotechnology - Cyber Platform - Engineering Research Center Observatory. NSF Supplement (Michael McLennan, Purdue University, Katy Börner) Dec 15 – Nov 17.
- Maps and Macroscopes. Exhibit funding by the Consortium for the Study of Religion, Ethics, and Society, Sept. 15 - Aug 16.
- SciSIP Agenda Setting Conference on Modelling Science, Technology, and Innovation. NSF #1546824 Award (Katy Börner and Stasa Milojevic) Jan. 16 – Dec. 16.
- Studying the Impact of Gaming Elements on Retention and Learning in the IVMOOC. Indiana University Bloomington Learning Analytics Fellows Program Award (Katy Börner), Sept. 14 - Aug 16.
- Visualizing Healthcare System Dynamics in Big Biomedical Science. NIH U01CA198934 (Griffin Weber, Harvard University, Katy Börner) June 15 - May 18.
- SMS-VAT: A Scalable Multi-Scale Visual Analytical Tool. NIH SBIR Phase II. (Intelligent Automation, Inc.) Sept. 14 - Aug. 16.
- Innovation in an Aging Society. NIH NIA P01AG039347 Award (National Bureau of Economic Research) Sept. 13 - Aug. 18.

12



All papers, maps, tools, talks, press are linked from <http://cns.iu.edu>
 These slides will soon be at <http://cns.iu.edu/docs/presentations>

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Mapping Science Exhibit Facebook: <http://www.facebook.com/mappingscience>