

Visual Analytics

John Stasko

School of Interactive Computing

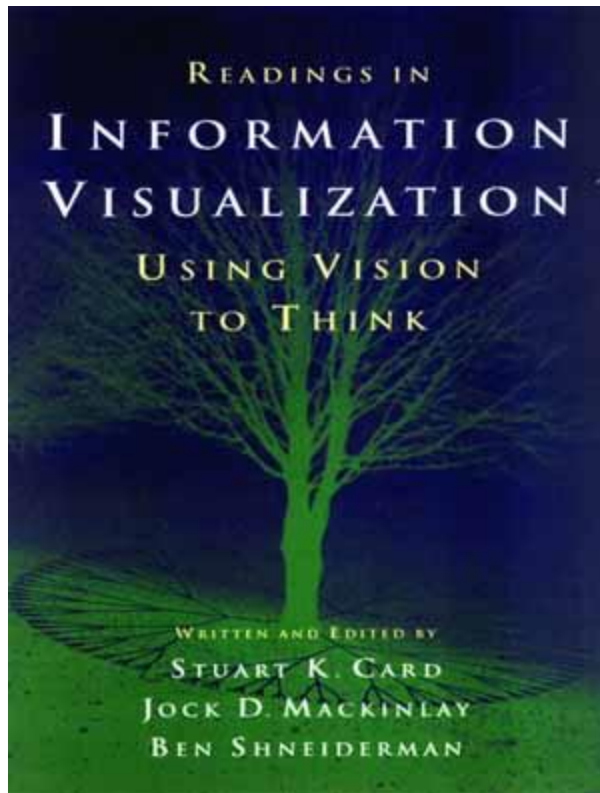
Georgia Institute of Technology

stasko@cc.gatech.edu



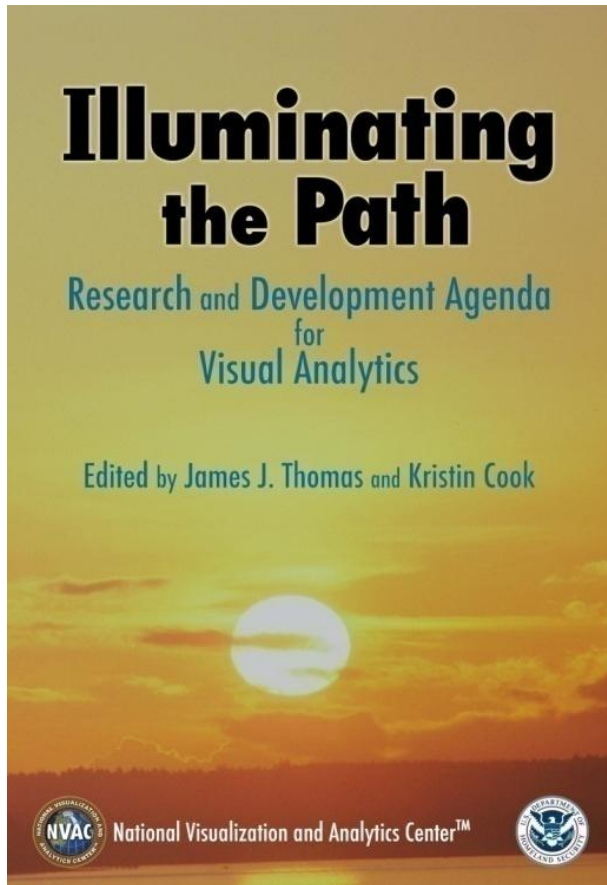
Data Analysis
Statistical
Algorithmic
Visual





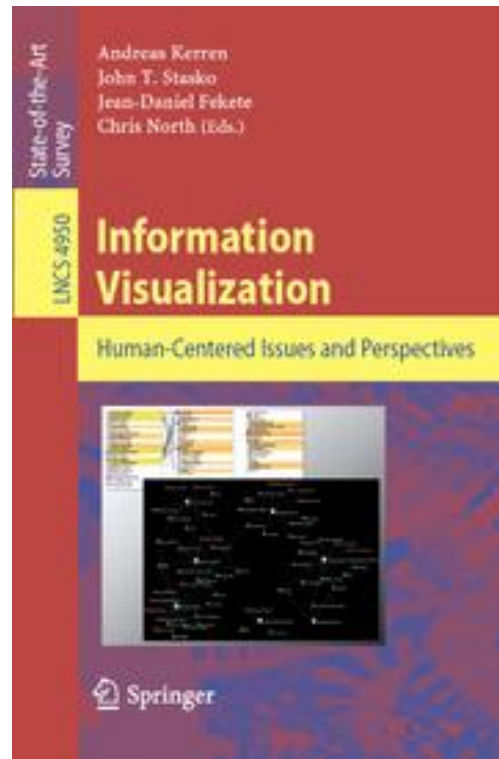
Visualization

“The use of Computer-supported, interactive visual representations of data to amplify cognition”



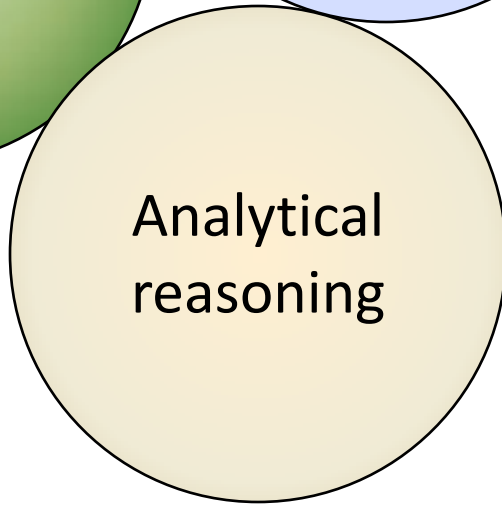
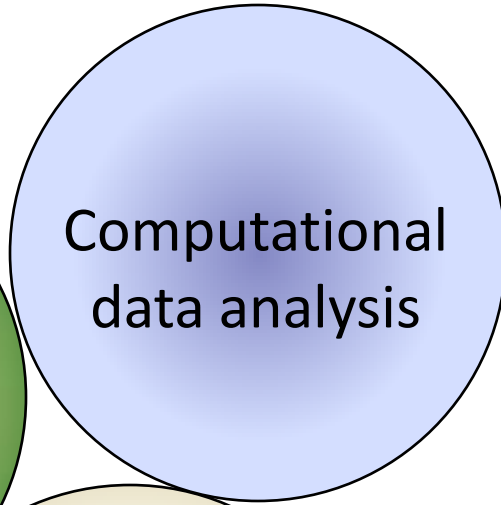
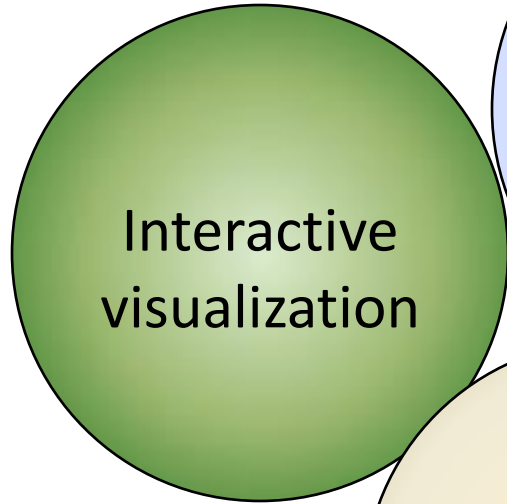
Visual analytics is the science of analytical reasoning facilitated by interactive visual interfaces

<http://nvac.pnl.gov/>



Visual analytics combines automated analysis techniques with interactive visualizations for an effective understanding, reasoning, and decision-making on the basis of very large and complex data sets

Keim, Andrienko, Fekete, Görg, Kohlhammer, and Melançon



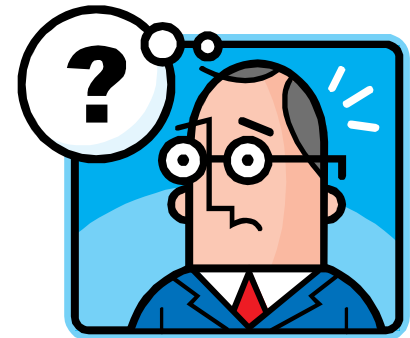
Visual analytics

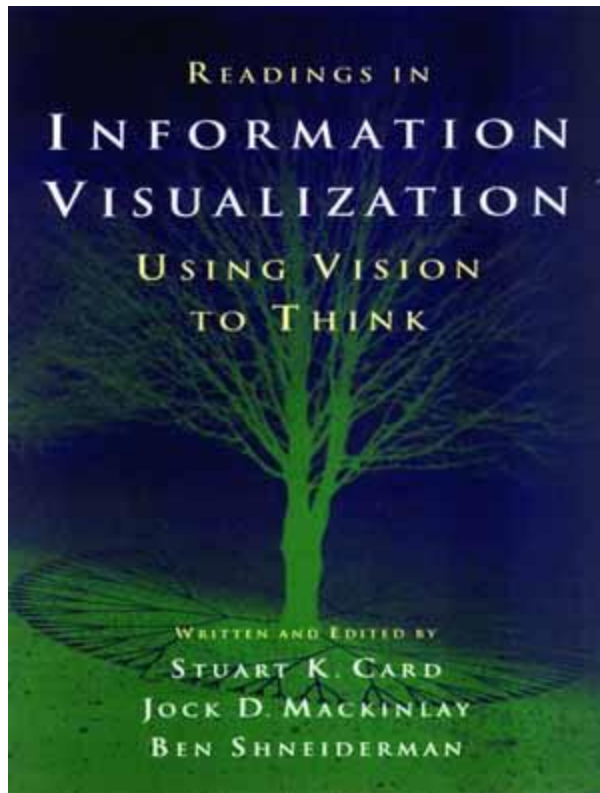
Visualization most useful in **exploratory data analysis**

Don't know what you're looking for

Don't have a priori questions

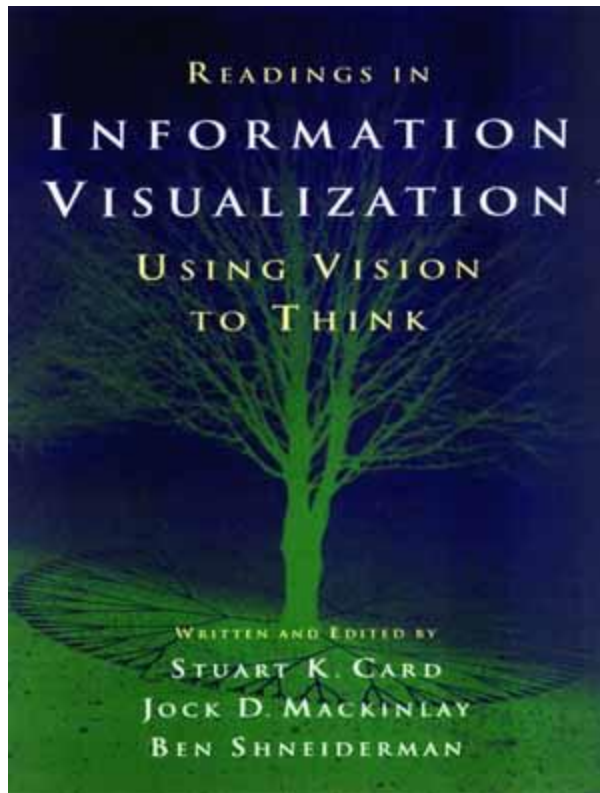
Want to know what questions to ask





Visualization

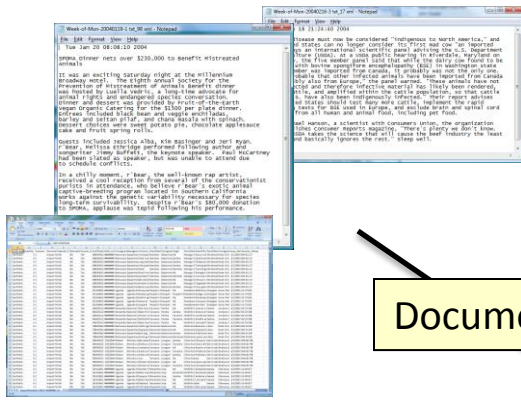
“The use of Computer-supported, interactive visual representations of data to amplify cognition”



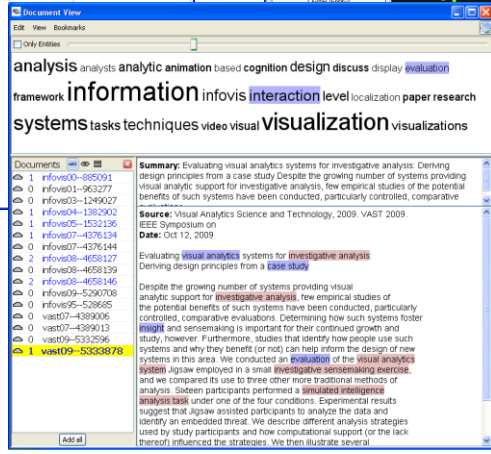
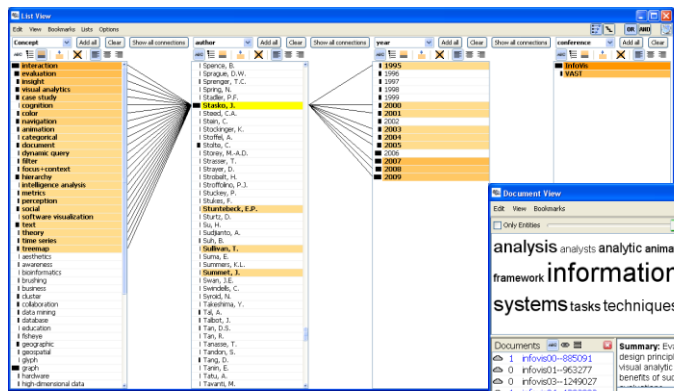
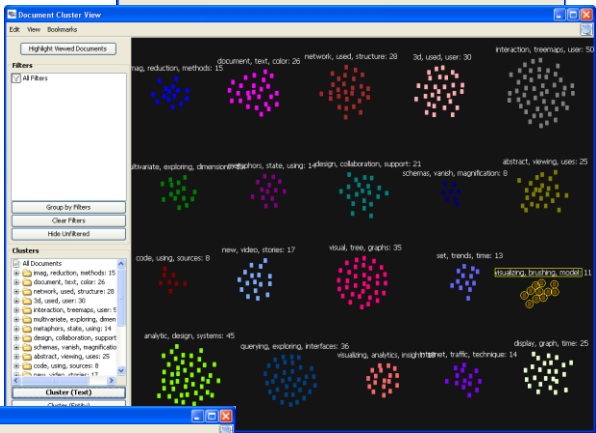
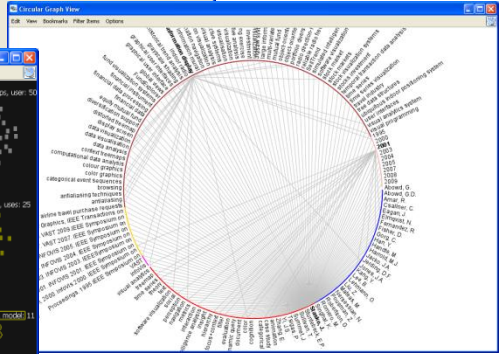
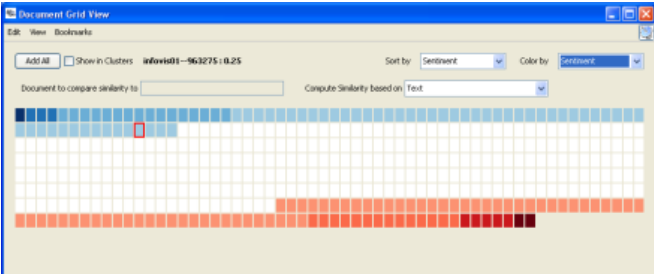
Visualization

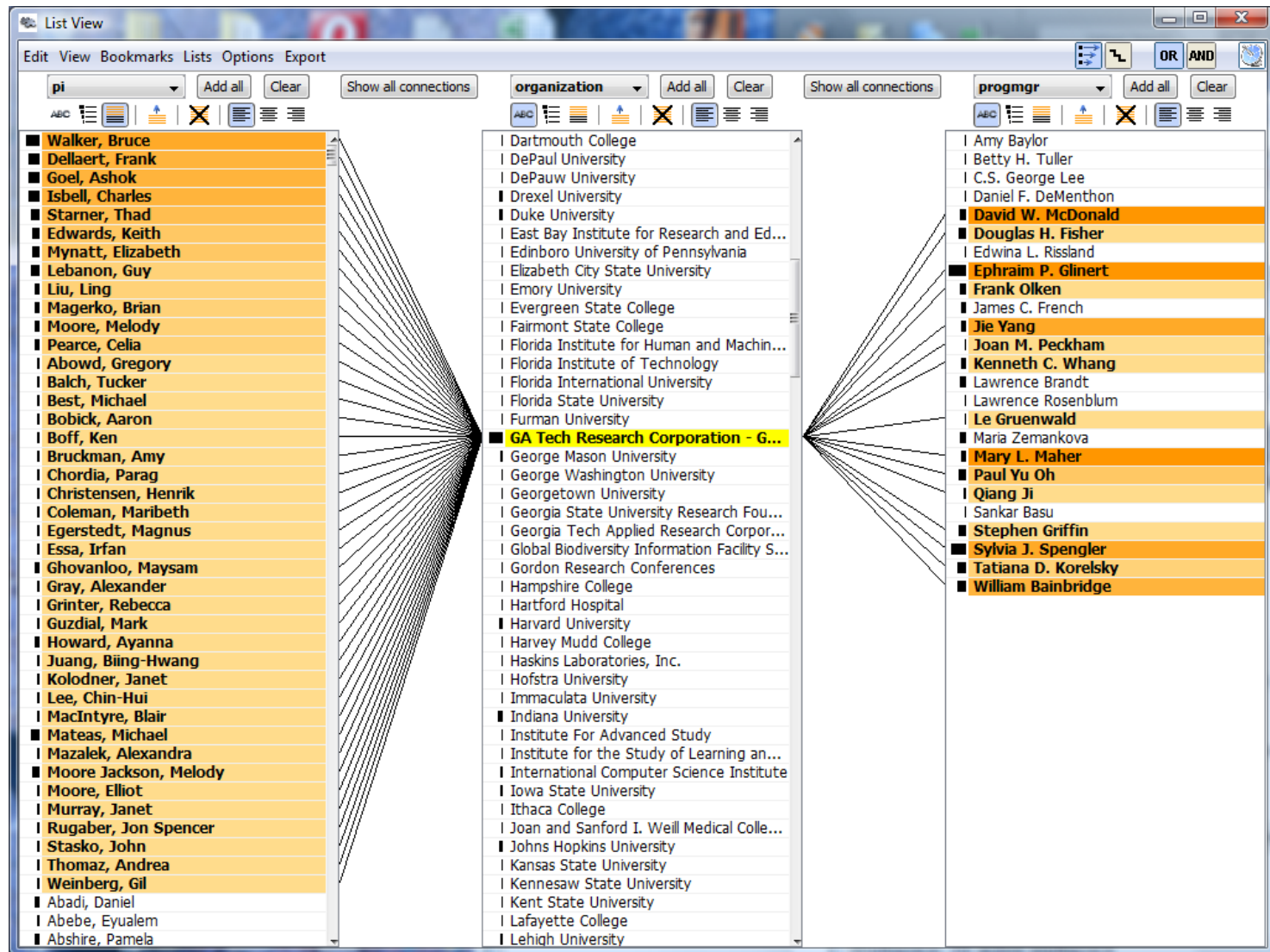
“The use of Computer-supported, **interactive** visual representations of data to amplify cognition”

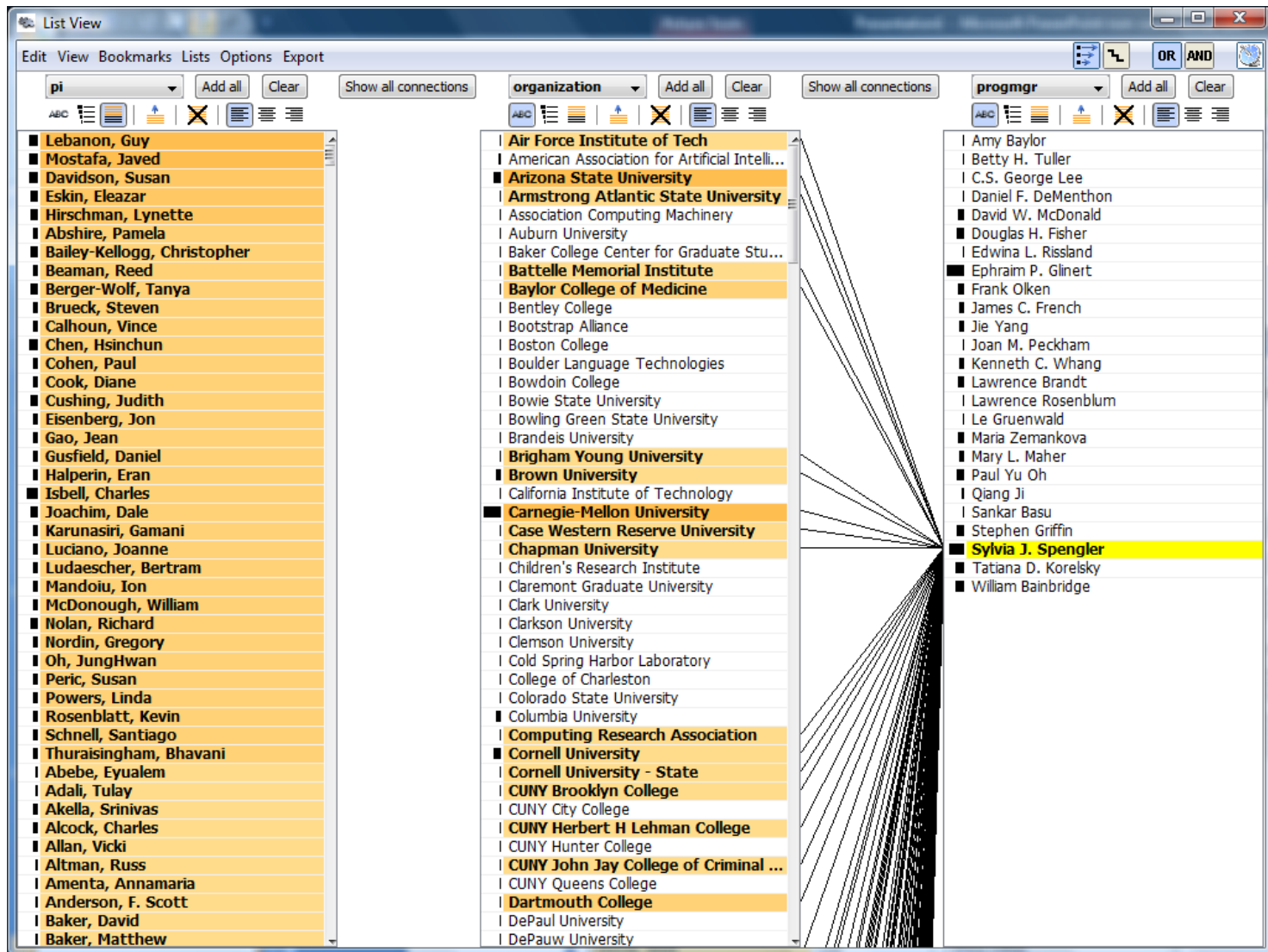
Jigsaw: Visual Analytics for Document Investigations



Documents







List View

Edit View Bookmarks Lists Options Export

pi Add all Clear Show all connections organization Add all Clear Show all connections progmgr Add all Clear Show all connections

ABC [Icons]

- Sawyer, Steven
- Darrell, Trevor
- Walker, Bruce
- Bailey, Nell
- Borner, Katy
- Carroll, John
- Clarkson, Gavin
- Contractor, Noshir
- Croft, W. Bruce
- Dellaert, Frank
- Finholt, Thomas
- Freire, Juliana
- Goel, Ashok
- Gumbretiere, Francois
- Isbell, Charles
- Murphy, Robin
- Tanner, Herbert
- Zickler, Todd
- Blake, M. Brian
- Burleson, Winslow
- Callan, Jamie
- Cassell, Justine
- Chen, Hsinchun
- Davidson, Susan
- Epstein, Susan
- Fischer, Gerhard
- Fox, Edward
- Greenwald, Amy
- Halpern, Joseph
- Han, Jawei
- Hebert, Martial
- Hirschberg, Julia
- Hwa, Rebecca
- Joachims, Thorsten
- Kerne, Andruid
- Lavie, Alon
- Lebanon, Guy
- Madden, Samuel
- Makedon, Filla
- Mankoff, Jennifer

- Pennsylvania State Univ University...
- Syracuse University
- University of Michigan Ann Arbor
- Air Force Institute of Tech
- American Association for Artificial Intelli...
- Arizona State University
- Armstrong Atlantic State University
- Association Computing Machinery
- Auburn University
- Baker College Center for Graduate Stu...
- Battelle Memorial Institute
- Baylor College of Medicine
- Bentley College
- Bootstrap Alliance
- Boston College
- Boulder Language Technologies
- Bowdoin College
- Bowie State University
- Bowling Green State University
- Brandeis University
- Brigham Young University
- Brown University
- California Institute of Technology
- Carnegie-Mellon University
- Case Western Reserve University
- Chapman University
- Children's Research Institute
- Claremont Graduate University
- Clark University
- Clarkson University
- Clemson University
- Cold Spring Harbor Laboratory
- College of Charleston
- Colorado State University
- Columbia University
- Computing Research Association
- Cornell University
- Cornell University - State
- CUNY Brooklyn College
- CUNY City College

- Amy Baylor
- Betty H. Tuller
- C.S. George Lee
- Daniel F. DeMenthon
- David W. McDonald
- Douglas H. Fisher

Document View

Edit View Bookmarks Export

Only Entities

arise capital collaborative communities computing design development federal funding human information innovations institute intellectual participants public research safety science social socio support systems technical technological

Documents [Icons]

- 2 0512458
- 1 0534889
- 3 0542168
- 1 0742687
- 0 0844618
- 1 0852688
- 1 0852689
- 2 0904080

Summary: Establishing the I-Conference: Intellectual Bases and Value of Interdisciplinary Research This award will support the first I-Conference for Information Schools ("i-schools") whose focus is on the interdisciplinary and multidisciplinary research and education related to Information and Communication Technologies (ICTs).

Source:

Date: Sep 15, 2005

Establishing the I-Conference: Intellectual Bases and Value of Interdisciplinary Research

This award will support the first I-Conference for Information Schools ("i-schools") whose focus is on the interdisciplinary and multidisciplinary research and education related to Information and Communication Technologies (ICTs). This conference will bring together faculty, students, and deans to articulate the challenges of i-schools, which include identity formation, curriculum development, academic life, and appropriate research agendas. One outcome will be increased visibility of i-schools and their vision to the larger academic community. Another will be to pull together a coherent community of scientist and educators who care about the study of ICTs and who will develop the next generation of scientists and educators.

Affiliated entities:

amount: 35000

award-instr: Standard Grant

directorate: CSE

division: IIS

fieldofapplication: 0104000 Information Systems

Keyword: education vision

organization: Pennsylvania State Univ University Park

pi: Sawyer, Steven

progmgr: William Bainbridge

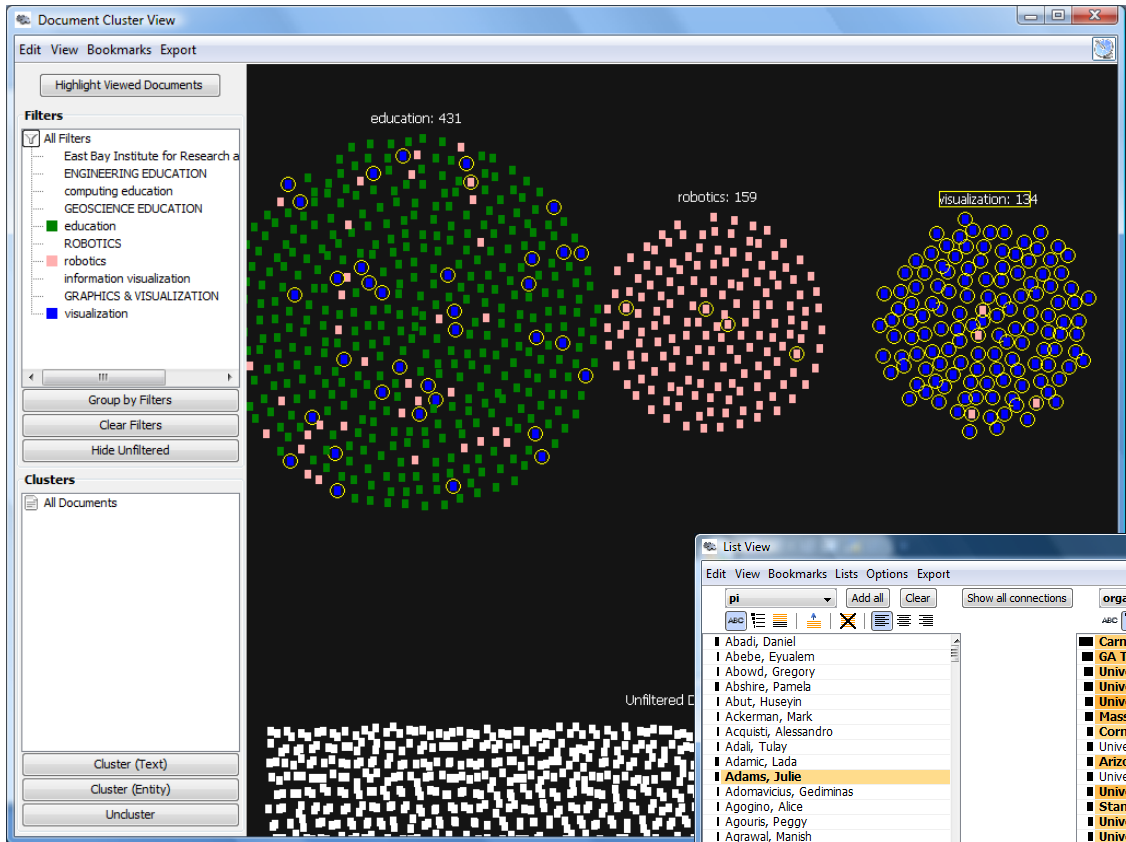
program: DIGITAL SOCIETY&TECHNOLOGIES

programmelementcode: 6850

programreferencecode: 7484 9215 HPCC

state: PA

Add all



List View

Edit View Bookmarks Lists Options Export

Show all connections

organization

Add all Clear

Show all connections

Keyword

Add all Clear

pi	organization	Keyword
Abadi, Daniel	Carnegie-Mellon University	agent-based
Abebe, Eyuaem	GA Tech Research Corporation - G...	algorithms
Abowd, Gregory	University of Maryland College Park	animation
Abshire, Pamela	University of Washington	architecture
Abut, Huseyin	University of Illinois at Urbana-Cha...	artificial intelligence
Ackerman, Mark	Massachusetts Institute of Techn...	assistive technology
Acquisti, Alessandro	Cornell University	augmented reality
Adali, Tulay	University of Southern California	bioinformatics
Adamic, Lada	Arizona State University	cognitive science
Adomavicius, Gediminas	University of Massachusetts Amherst	compiler
Agogino, Alice	University of California-Irvine	computational biology
Agouris, Peggy	Stanford University	computational geometry
Agrawal, Manish	University of California-San Diego	computational science
Agrawal, Sunil	University of Minnesota-Twin Cities	computer games
Agrawala, Maneesh	University of Michigan Ann Arbor	computer graphics
Ahn, Gail-Joon	University of Pennsylvania	computer vision
Ahuja, Manju	Purdue University	computing education
Ahuja, Narendra	University of California-Berkeley	cryptography
Alamaki, Anastassia	Northwestern University	cscw
Akella, Srinivas	Indiana University	data analysis
Alcock, Charles	University of California-Los Angeles	data mining
Allan, James	University of Pittsburgh	database
Allan, Vicki	Columbia University	distributed computing
Allen, James	Pennsylvania State Univ University Park	education
Allen, Peter	Virginia Polytechnic Institute and ...	embedded systems
Allen, Robert	Texas Engineering Experiment Sta...	formal methods
Almonos, John (Yannis)	Brown University	graphics
Altman, Russ	University of Colorado at Boulder	high-performance computing
Alvarado, Christine	University of California-Santa Barb...	human-computer interaction
Alwan, Abeer	University of Texas at Austin	human-computer interaction
Amato, Nancy	Northeastern University	information retrieval
Amenta, Annamaria	Ohio State University Research Fo...	information visualization
Amir, Eyal	University of Arizona	intelligent agent
Anagnostopoulos, Georgios	University of North Carolina at Cha...	learning sciences
Anderson, F. Scott	Johns Hopkins University	machine learning
Anderson, Michael	Drexel University	middleware
Anderson, Monica	Duke University	mobile computing
Anderson, Richard	SUNY at Stony Brook	multi-agent systems
Angryk, Rafal	University of Illinois at Chicago	multimedia
Arens, Yigal	University of Utah	nanotechnology
Arms, William	University of New Mexico	network
Arroyo, Antonio	Harvard University	networking
Ascoli, Giorgio	Rutgers University New Brunswick	object-oriented
	University of Central Florida	operating system



Ploceus: Network Visualization from Tabular Data

Zhicheng Liu (PhD student)

(a) GRANT

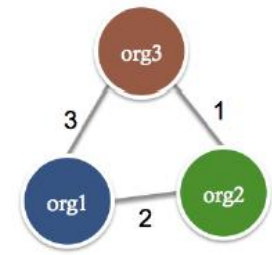
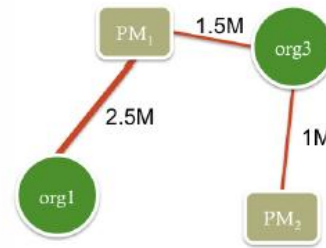
GID	Title	Program	Program Manager	Amount
1	Data Mining of Digital Behavior	Statistics	Sylvia Spengler	2241750
2	Real-time Capture, Management and Reconstruction of Spatio-Temporal Events	Information Technology Research	Maria Zemankova	430000
3	Statistical Data Mining of Time-Dependent Data with Applications in Geoscience and Biology	ITR for National Priorities	Sylvia Spengler	566644

(b) PERSON

PID	Name	Org
1	Padhraic Smyth	University of California Irvine
2	Sharad Mehrotra	University of California Irvine

(c) WorkOn

Person	Grant	Role
1	1	PI
2	1	CoPI
2	2	PI
1	3	PI



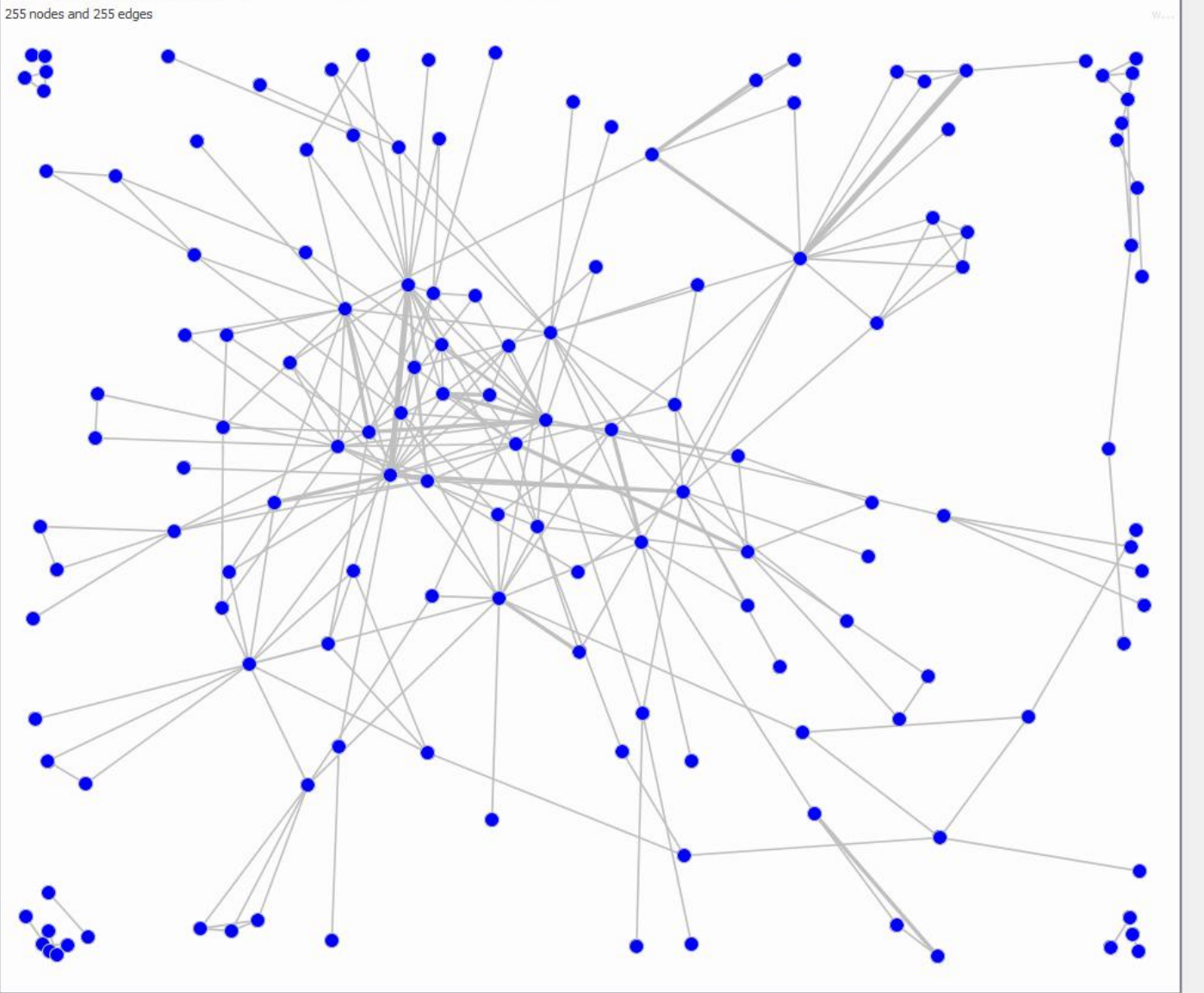


Data Sets

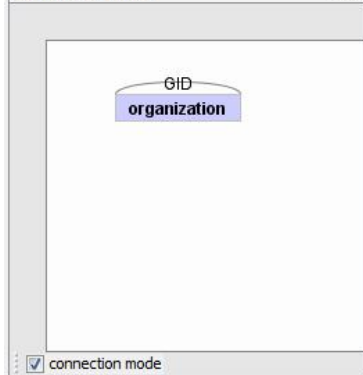
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Network Visualization6

Layout **Fruchterman-Reingold** Night Mode Node Label Edge Direction Edge Weight



Network Schema





Data Sets

NSF

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Network Schema

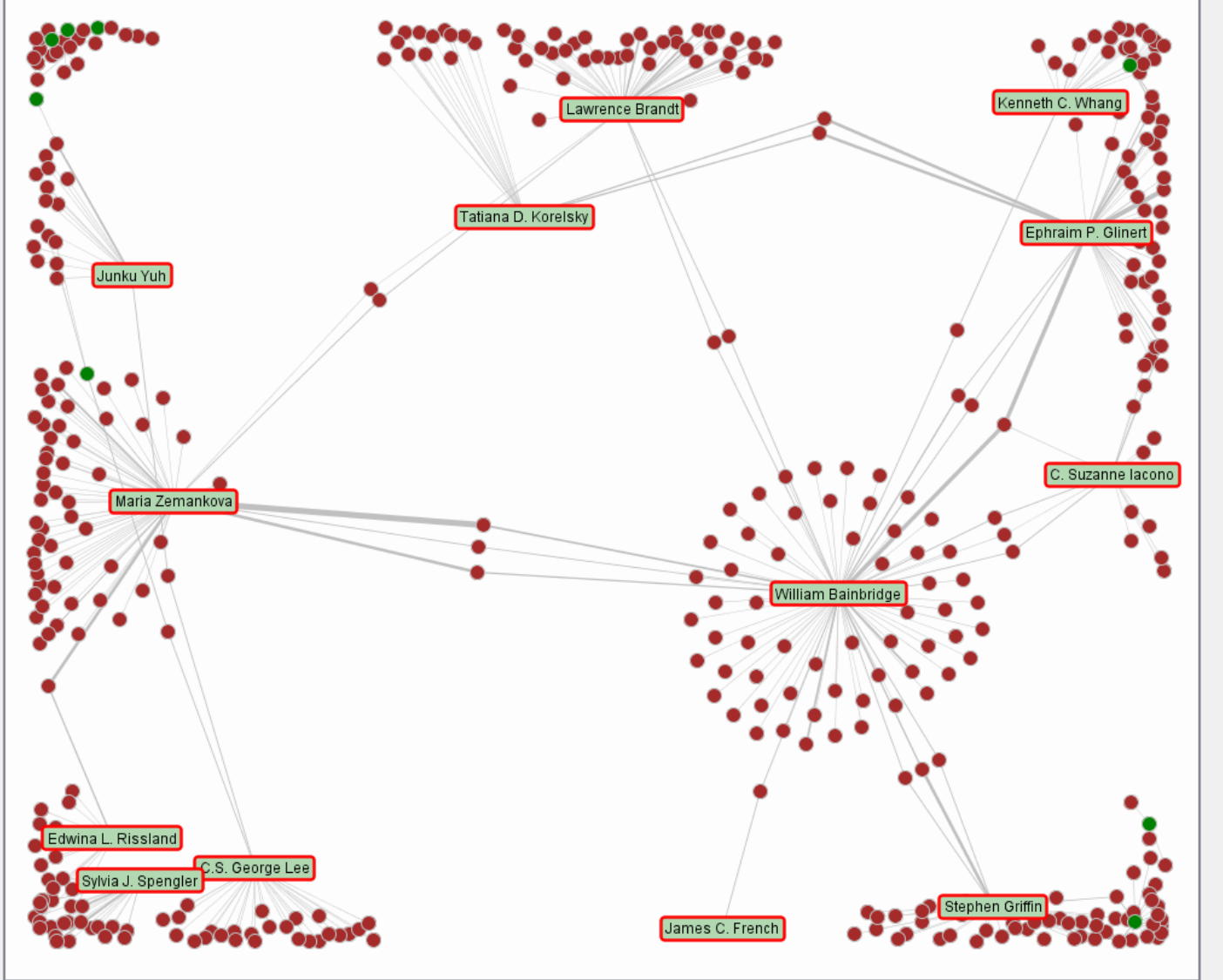
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connection mode

Network Visualization2

Layout Fruchterman-Reingold... Night Mode Node Label Edge Direction Edge Weight Clear View

428 nodes and 437 edges



Filters



Data Sets

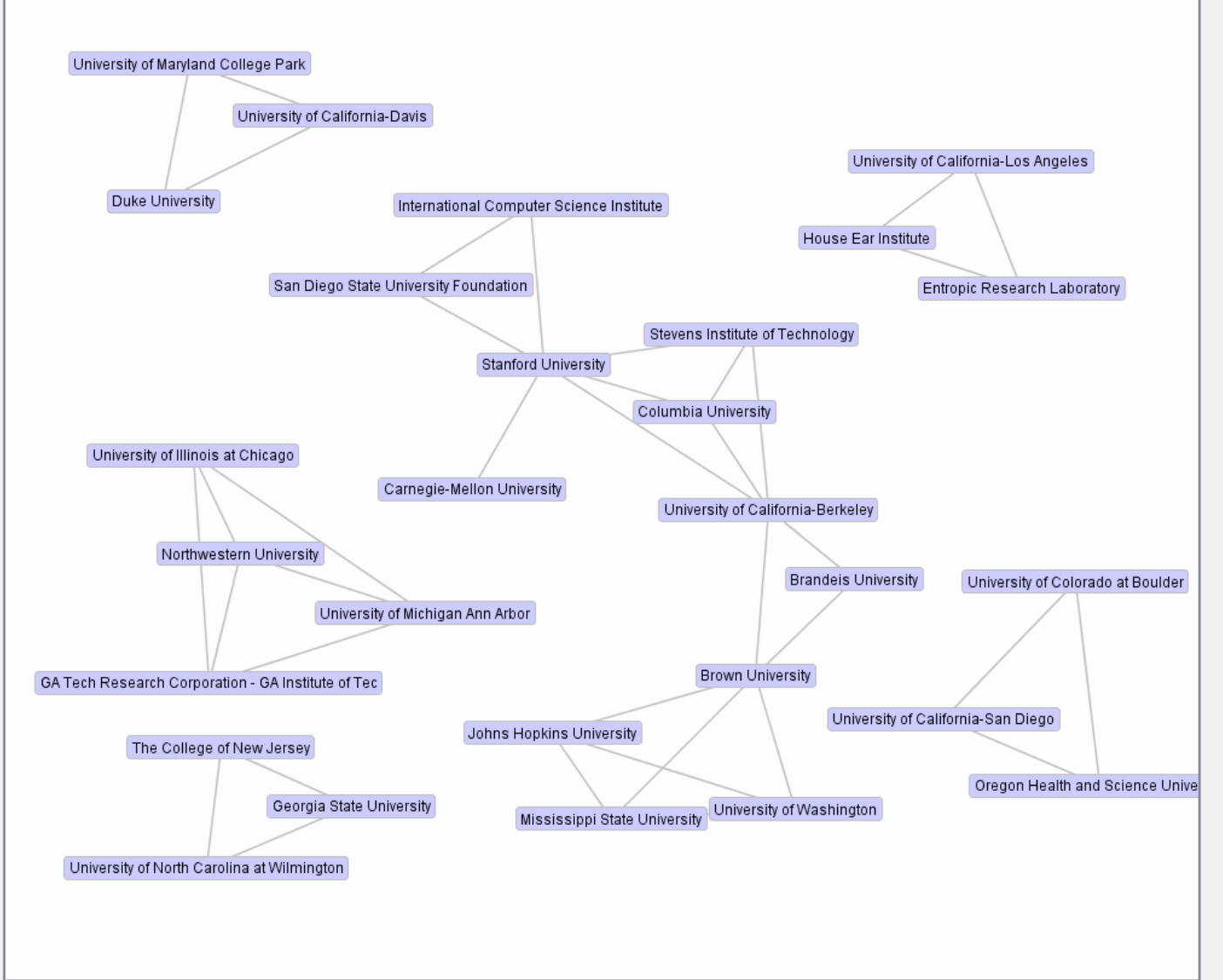
NSF

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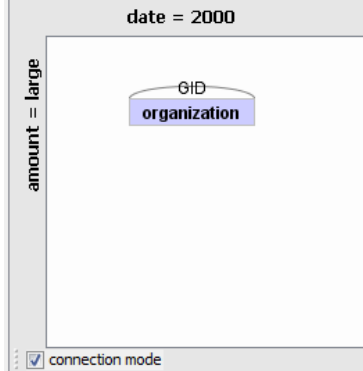
Network Visualization6 Slice/Dice 2000-large

Layout Meyer's Self-organizing... Night Mode Node Label Edge Direction Edge Weight Clear View

38 nodes and 37 edges



Network Schema



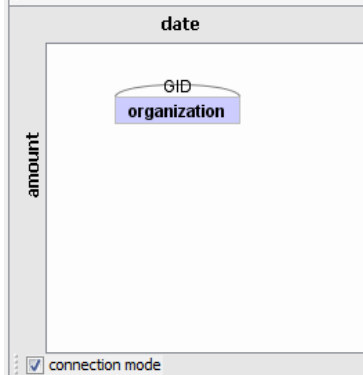


Data Sets

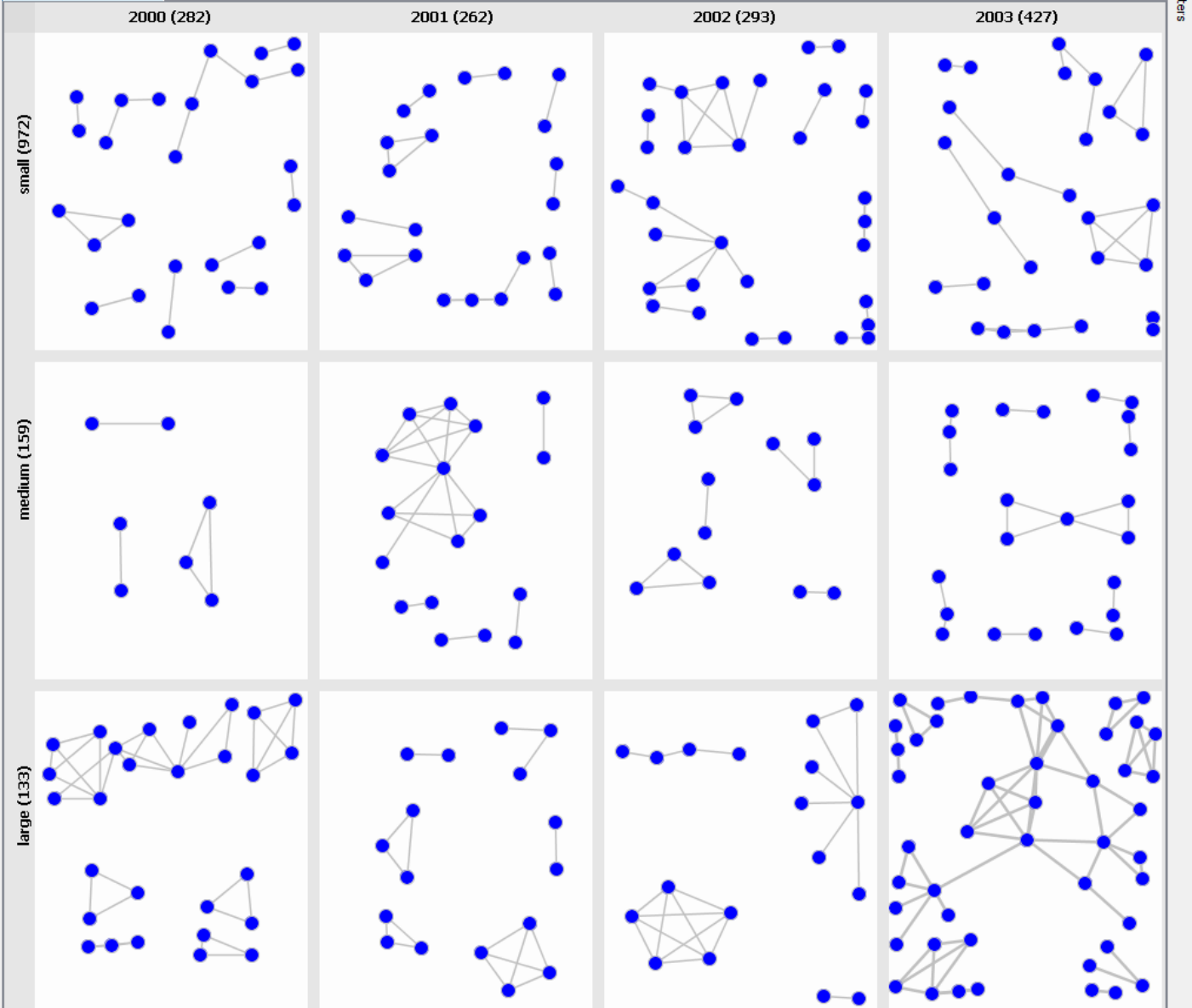
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- Works_On (2247 rows)
 - PID [int]
 - GID [int]
 - role [text]

Network Schema



Network Visualization6





Take Aways

Multiple methods of data analysis

Visual analytics

Combining automated computational analysis
with interactive visualization

Particularly useful for exploratory data analysis