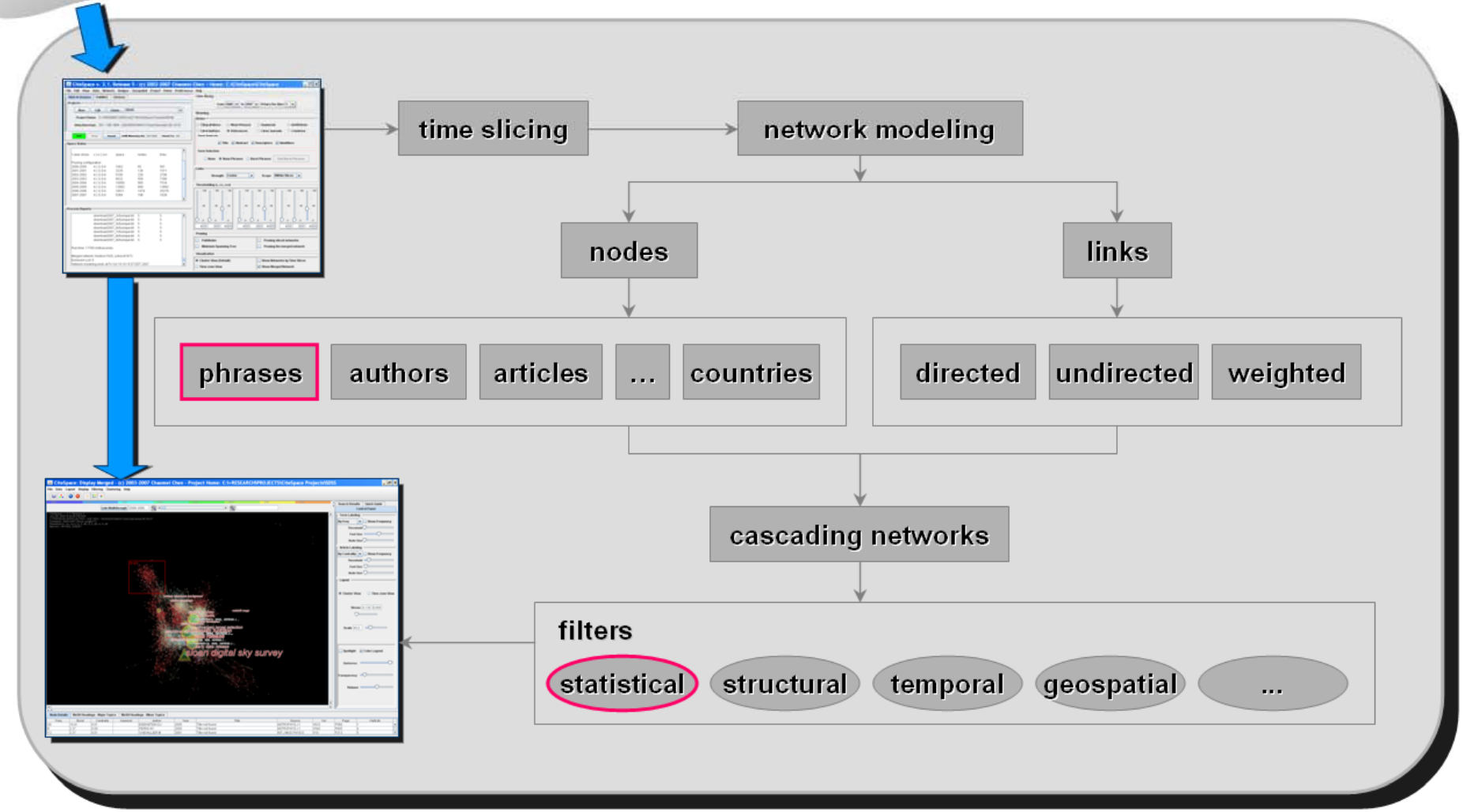
Workshop 2

Visualizing and Analyzing Scientific Literature with *CiteSpace*

Chaomei Chen
College of Information Science and Technology
Drexel University
Email: chaomei.chen@cis.drexel.edu

OVERVIEW:
THE DESIGN OF CITESPACE

CiteSpace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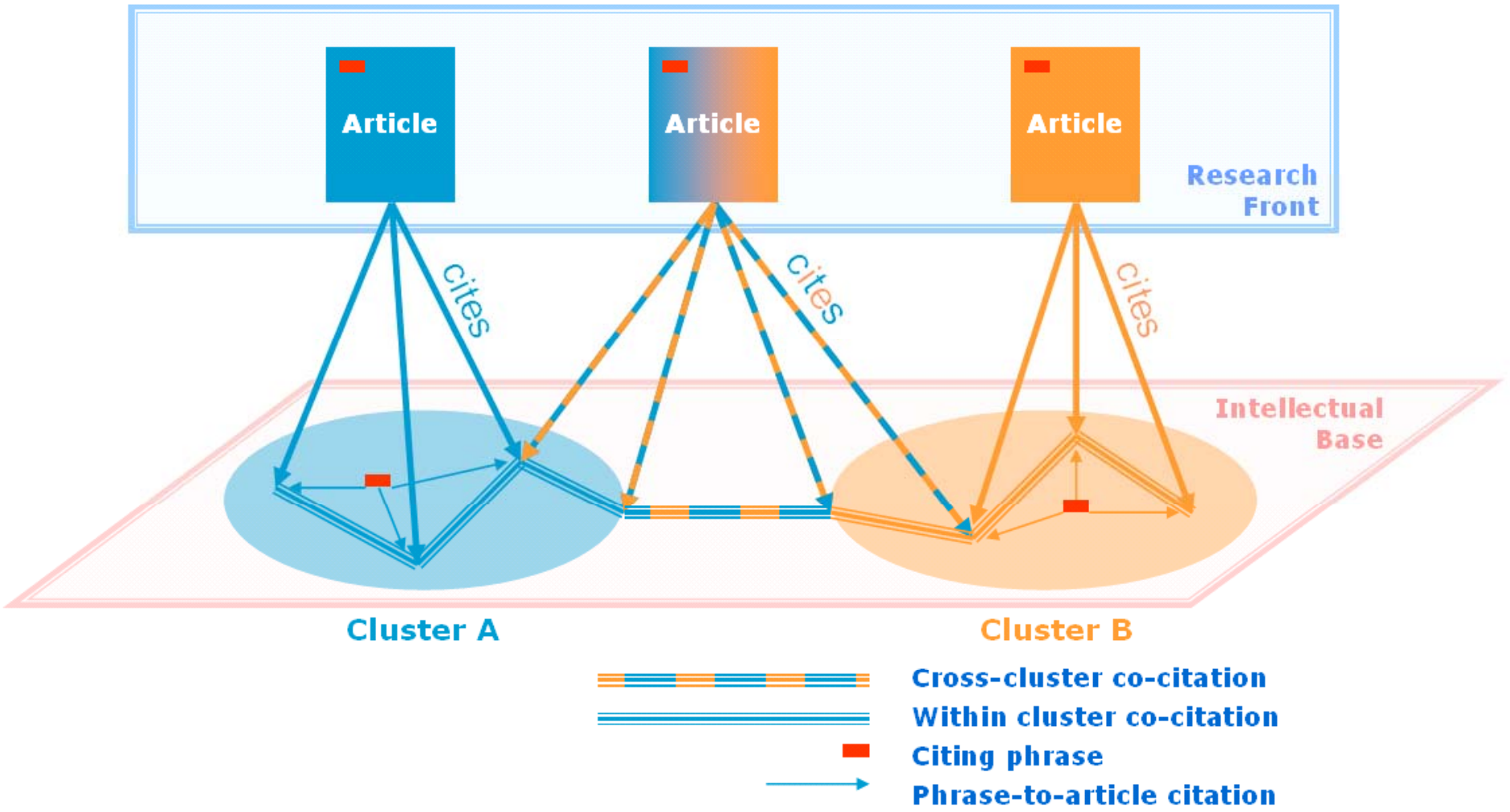
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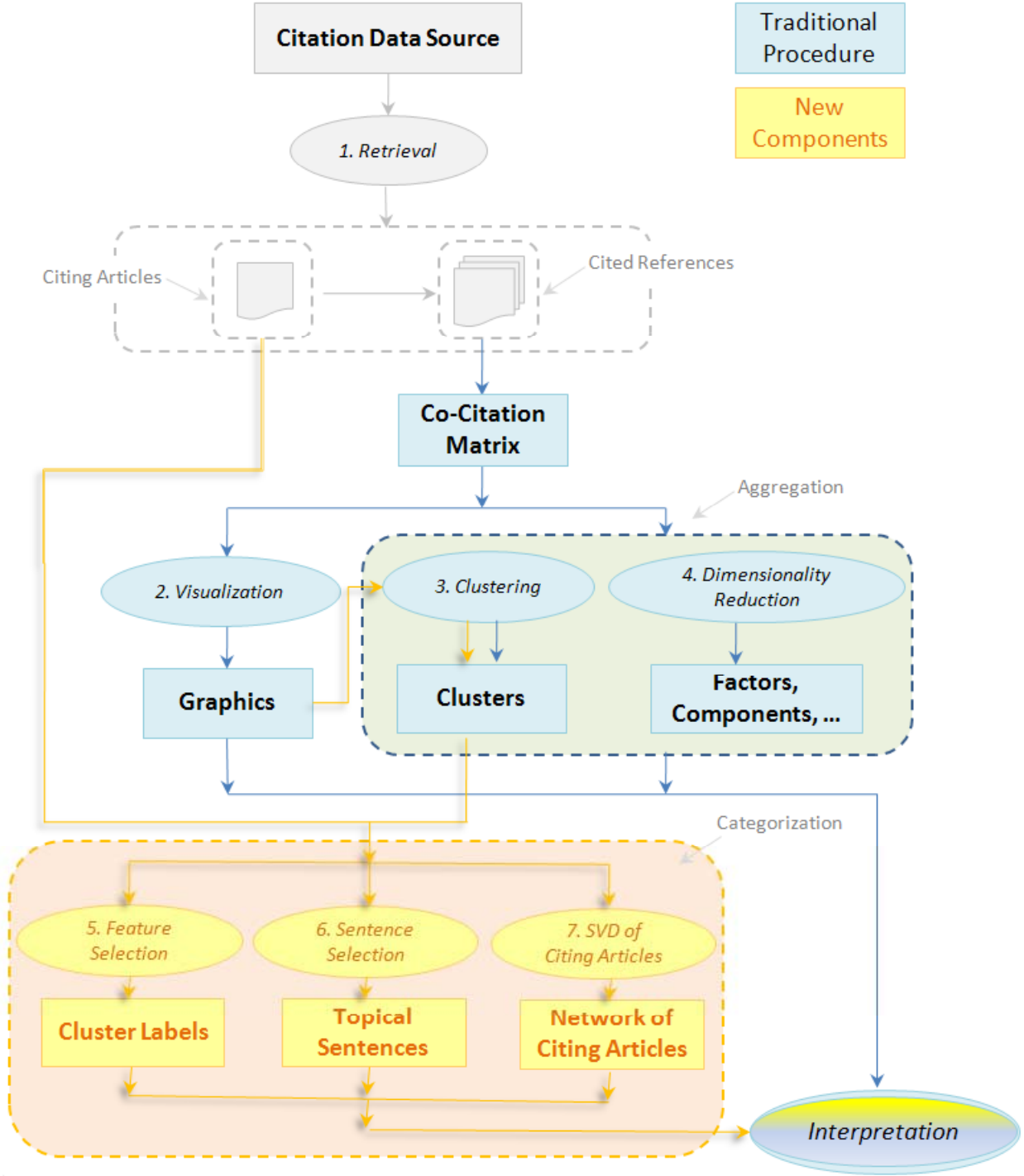
Phrase-to-article citation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1. Retrieval
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Co-Citation Matrix
Aggregation
2. Visualization
3. Clustering
4. Dimensionality Reduction
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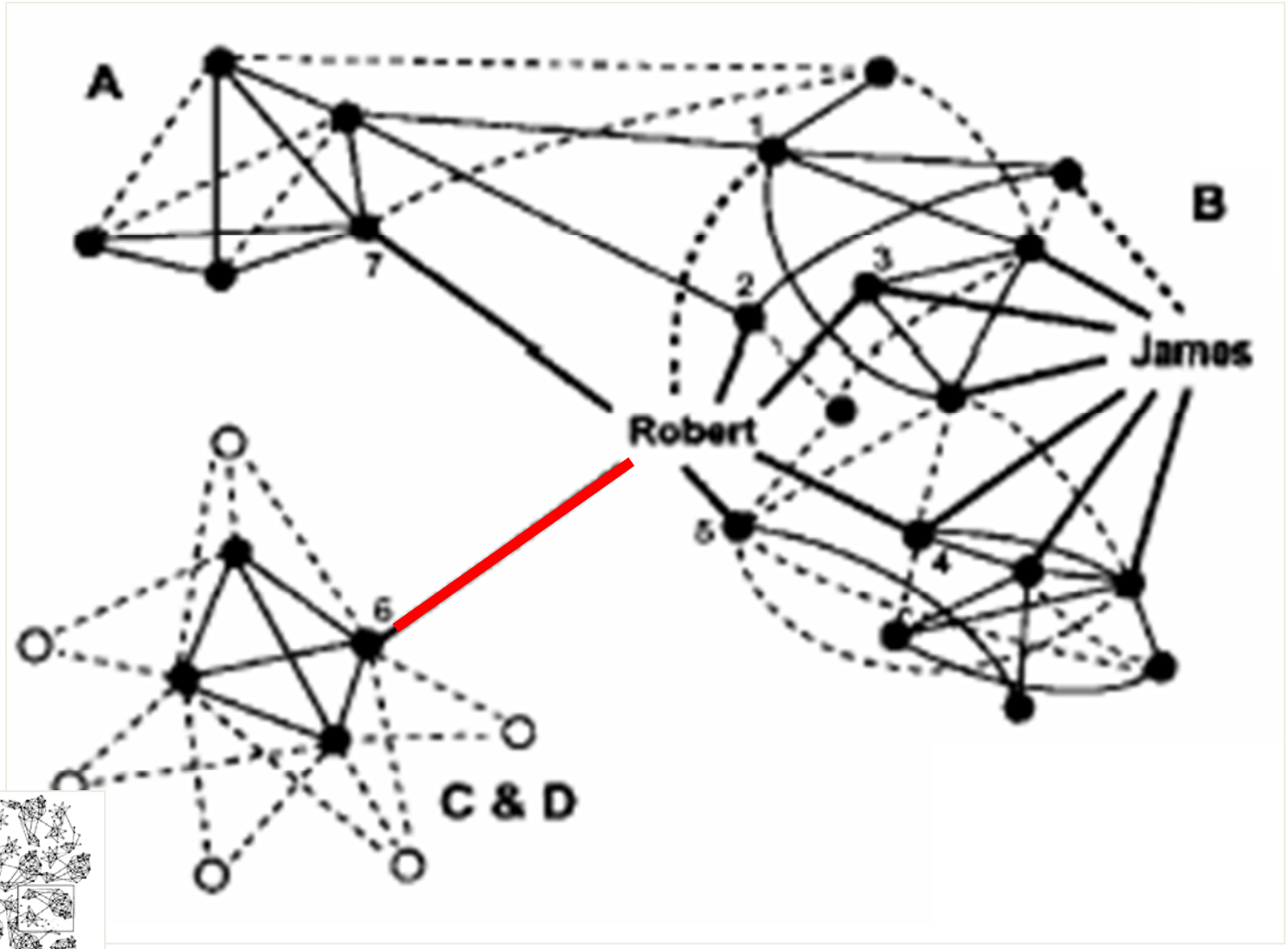
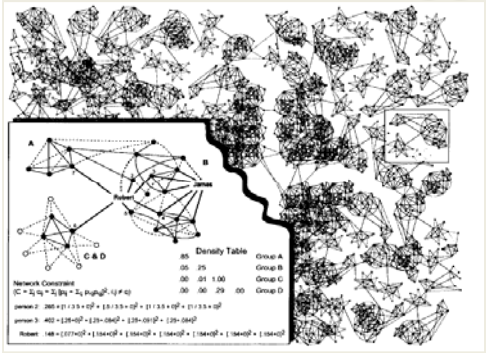
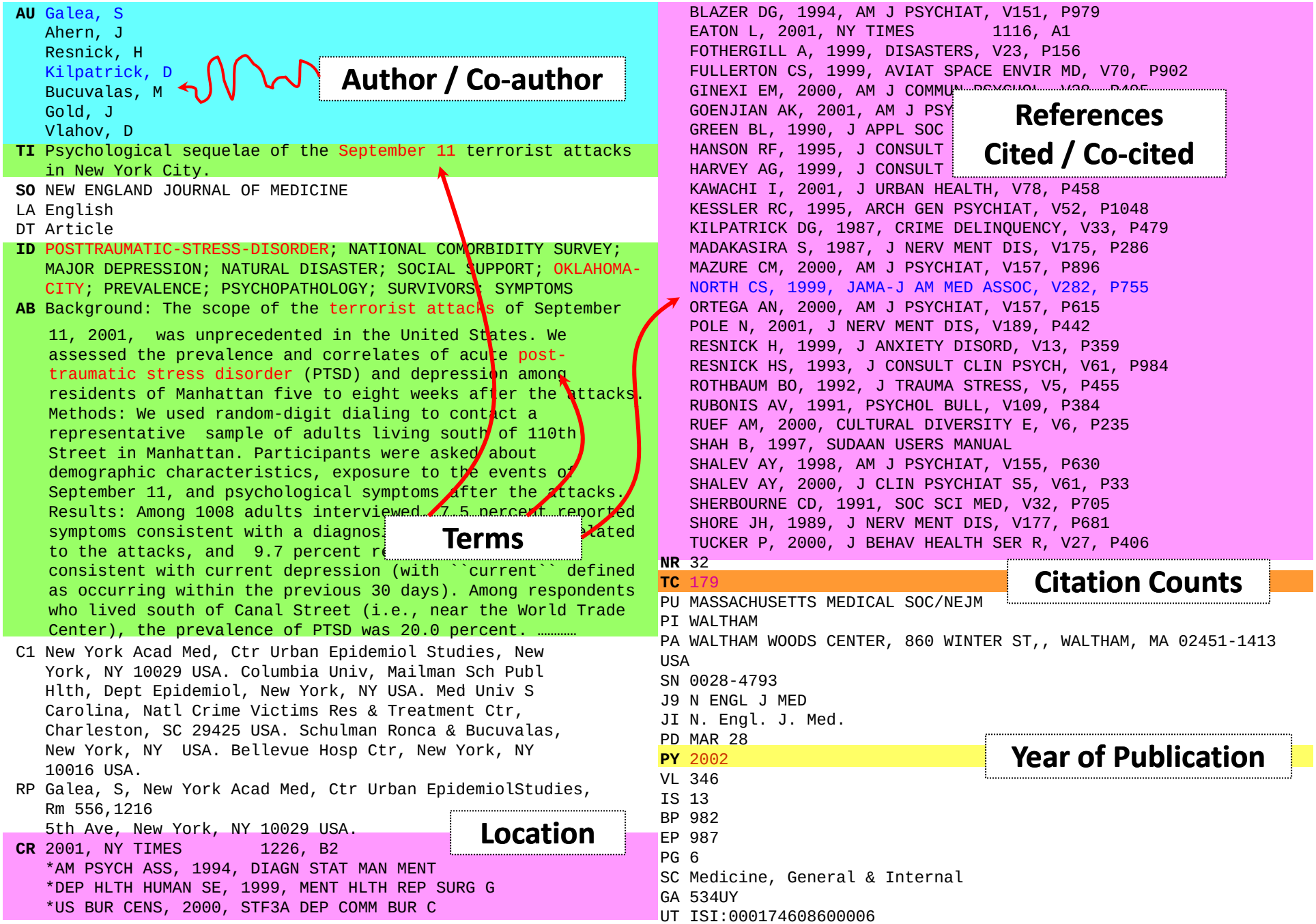
Clusters
Factors, Components, ...
Categorization
5. Feature Selection
6. Sentence Selection
7. SVD of Citing Articles
Cluster Labels
Topical Sentences
Network of Citing Articles
Interpretation

Structural Holes in Social Networks





http://www.wellcome.ac.uk/News/Media-office/Press-releases/2008/WTX050156.htm
An example of the areas to which we might allocate more memory when watching a relay race. Image courtesy of actionplus.co.uk.



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Ahern, J
Resnick, H
Kilpatrick, D
Bucuvalas, M
Gold, J
Vlahov, D

Author / Co-author

TI Psychological sequelae of the September 11 terrorist attacks in New York City.

SO NEW ENGLAND JOURNAL OF MEDICINE
LA English
DT Article

ID POSTTRAUMATIC-STRESS-DISORDER; NATIONAL COMORBIDITY SURVEY; MAJOR DEPRESSION; NATURAL DISASTER; SOCIAL SUPPORT; OKLAHOMA-CITY; PREVALENCE; PSYCHOPATHOLOGY; SURVIVORS; SYMPTOMS

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Terms

C1 New York Acad Med, Ctr Urban Epidemiol Studies, New York, NY 10029 USA. Columbia Univ, Mailman Sch Publ Hlth, Dept Epidemiol, New York, NY USA. Med Univ S Carolina, Natl Crime Victims Res & Treatment Ctr, Charleston, SC 29425 USA. Schulman Ronca & Bucuvalas, New York, NY USA. Bellevue Hosp Ctr, New York, NY 10016 USA.
RP Galea, S, New York Acad Med, Ctr Urban EpidemiolStudies, Rm 556,1216
5th Ave, New York, NY 10029 USA.

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TUCKER P, 2000, J BEHAV HEALTH SER R, V27, P406

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NR 32
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Citation Counts

PU MASSACHUSETTS MEDICAL SOC/NEJM
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SN 0028-4793
J9 N ENGL J MED
JI N. Engl. J. Med.
PD MAR 28
PY 2002

Year of Publication

VL 346
IS 13
BP 982
EP 987
PG 6
SC Medicine, General & Internal
GA 534UY
UT ISI:000174608600006
ER

co-occurring burst terms

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author co-citation

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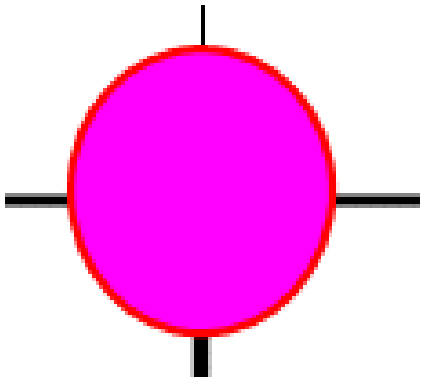
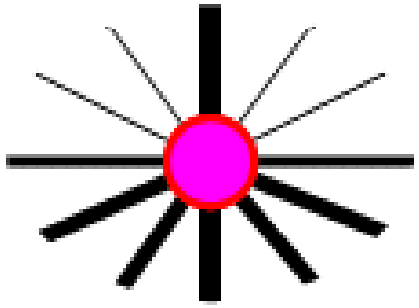


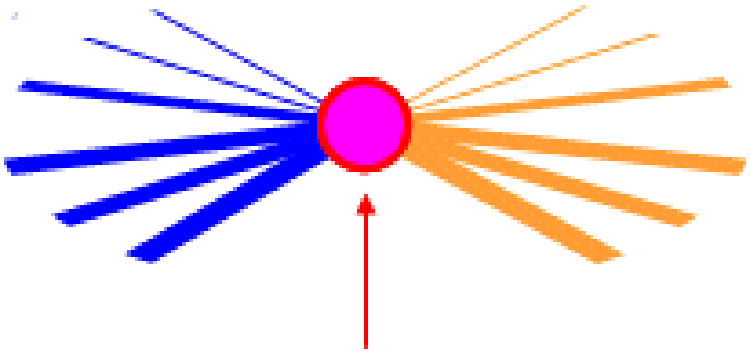
Landmark node

large radius



Hub node

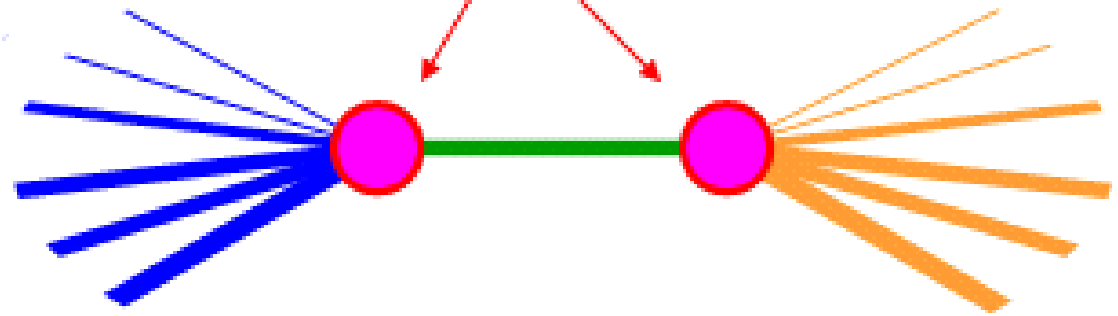
large degree



Pivot node

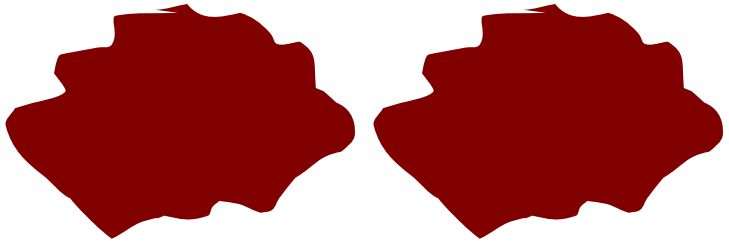
exclusive joints of clusters

or network patches

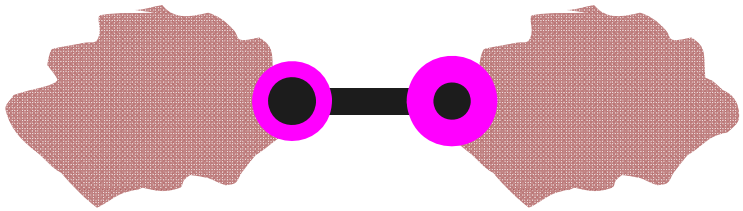


Expected Patterns

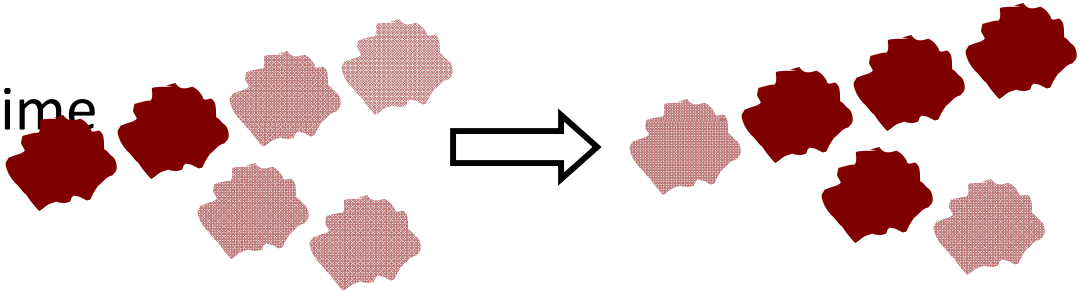
- Thematic grouping



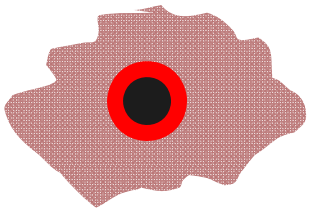
- Intellectual turning points

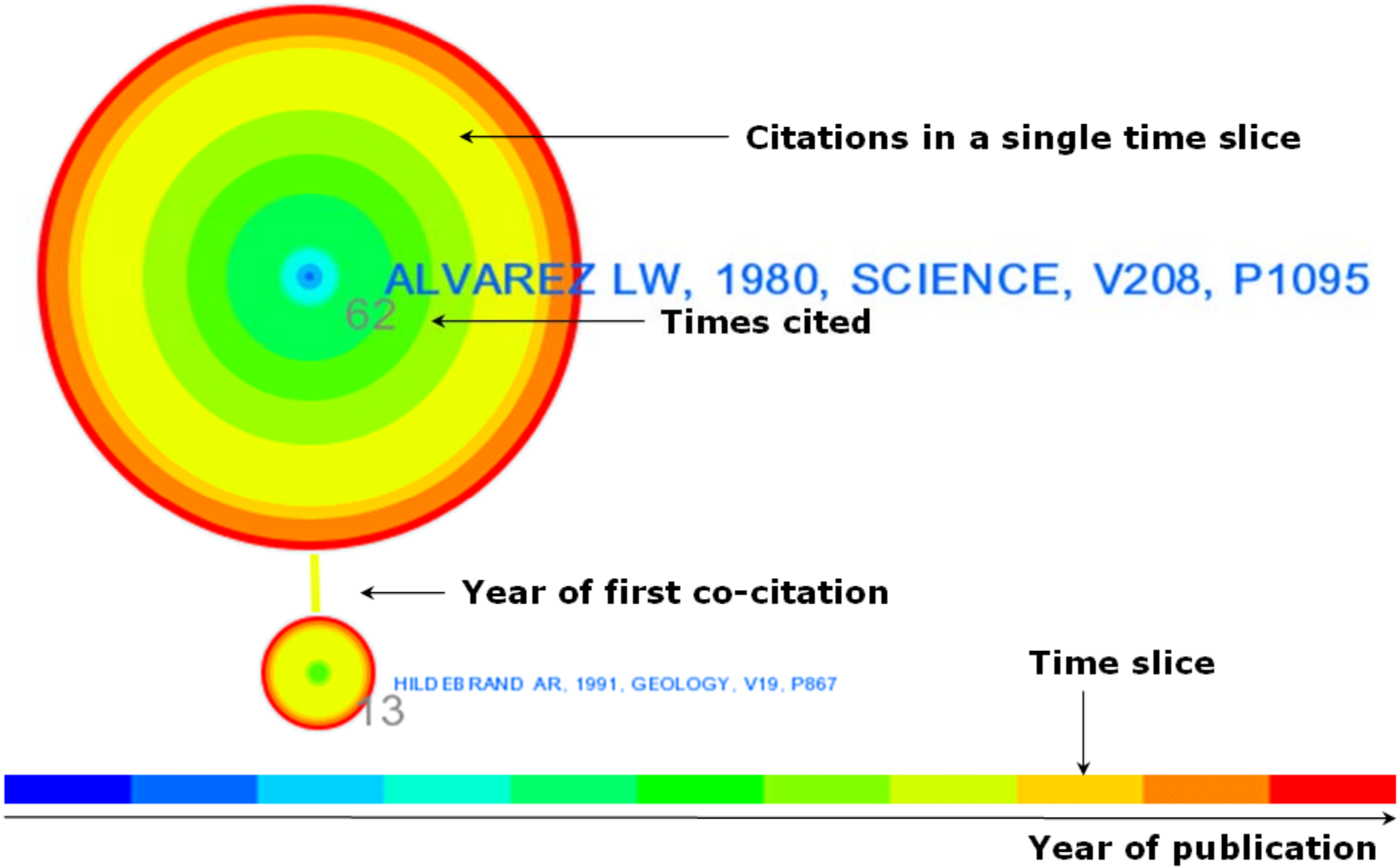


- Thematic change over time



- Abrupt changes associated with triggers

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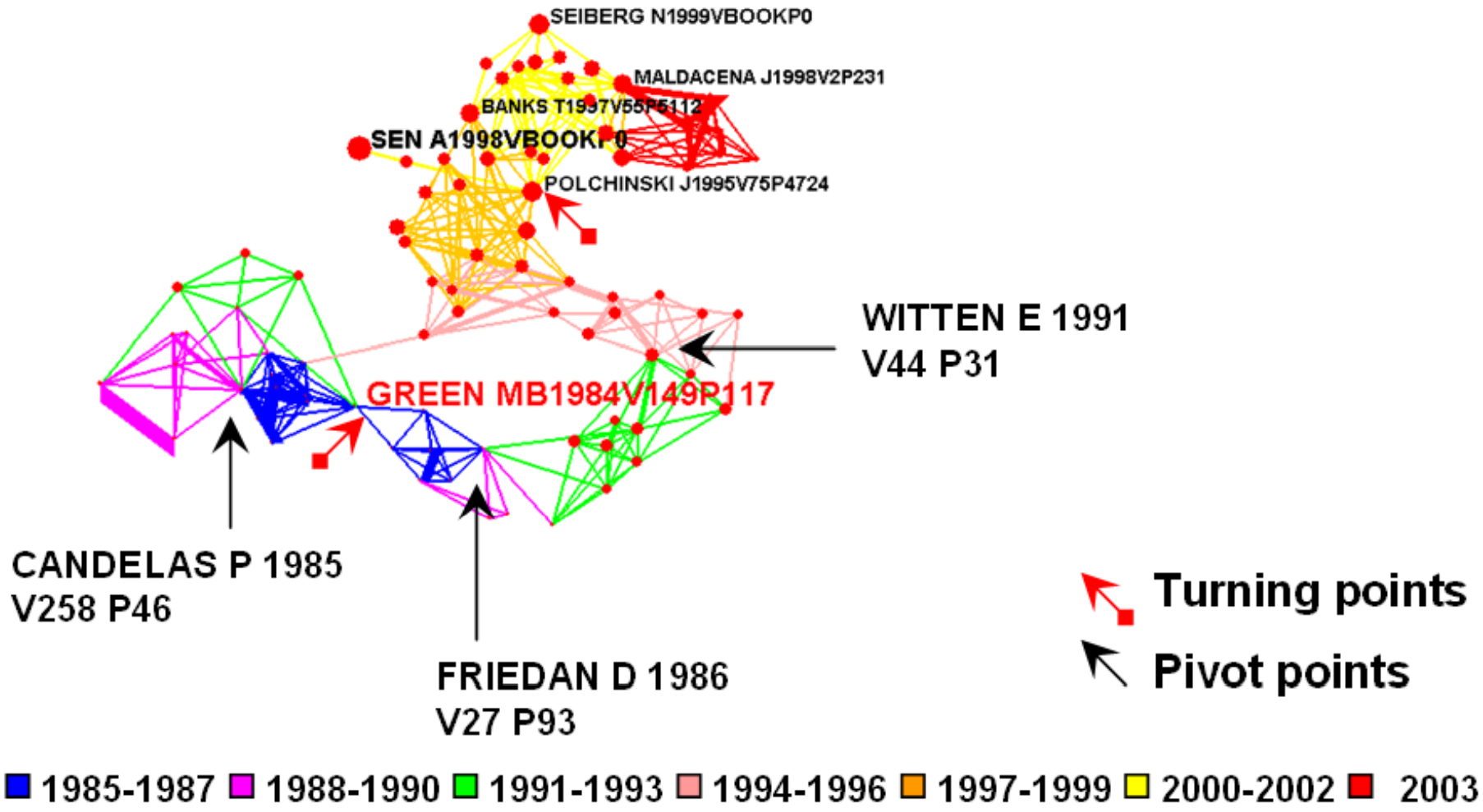
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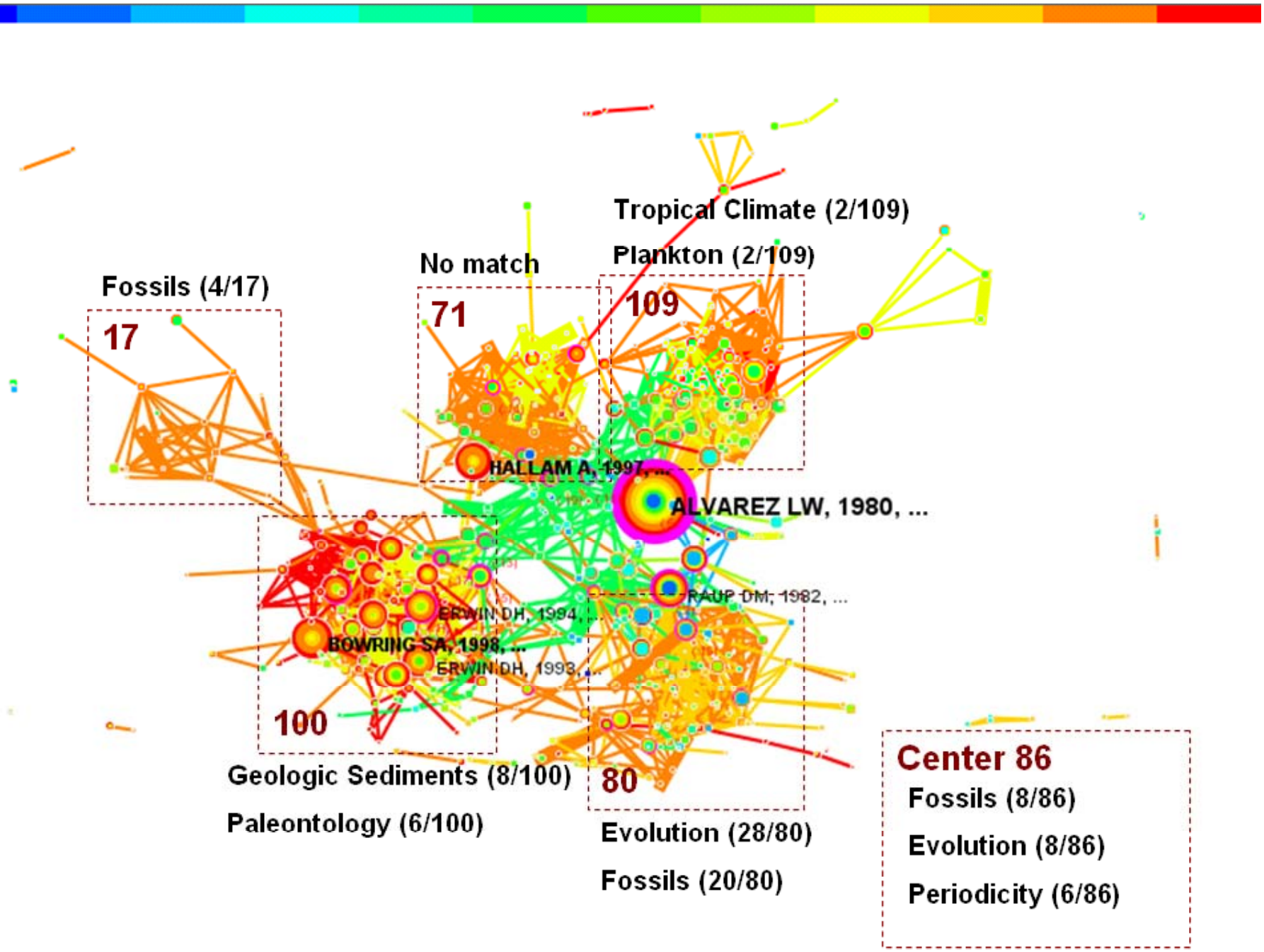
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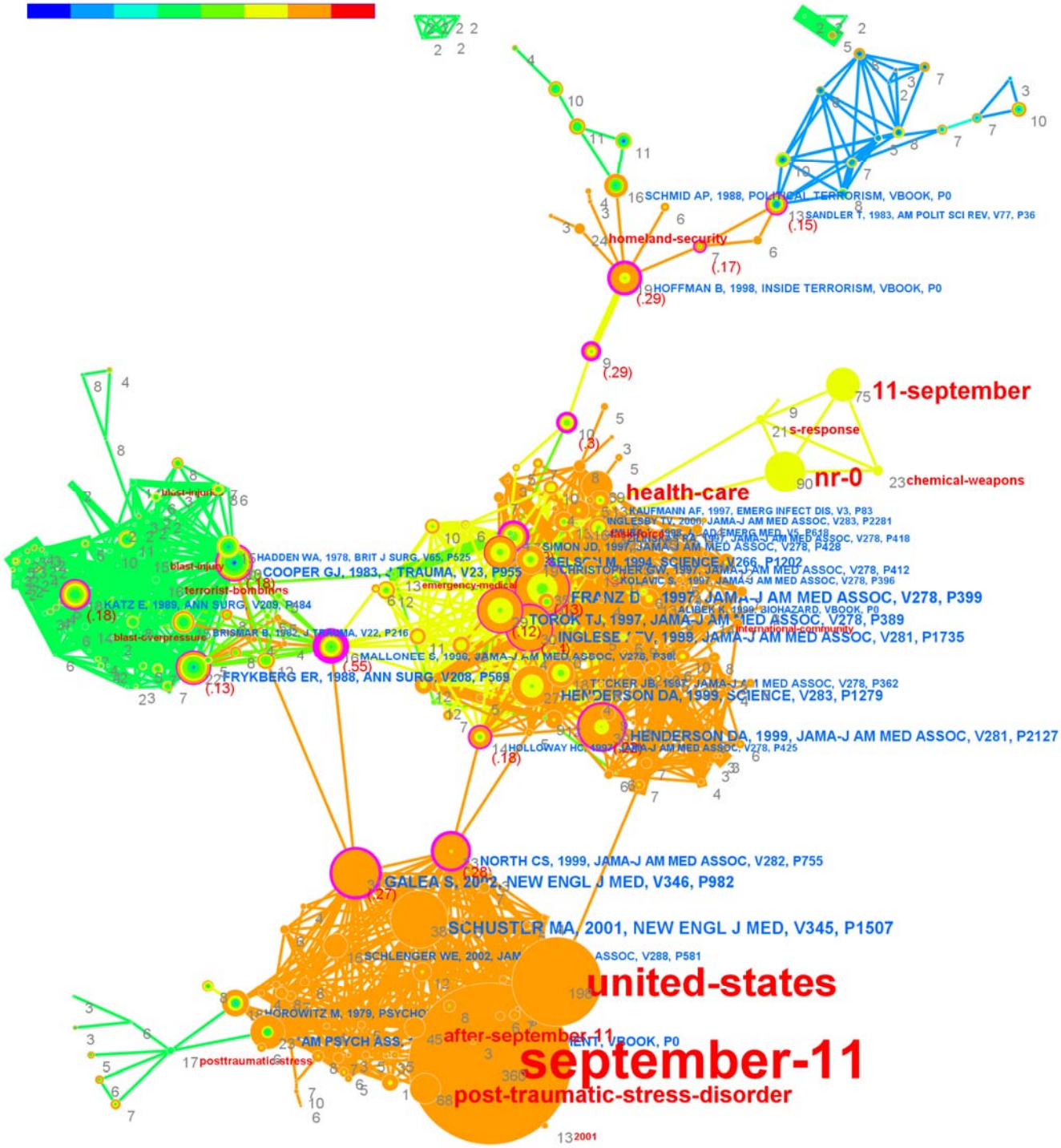
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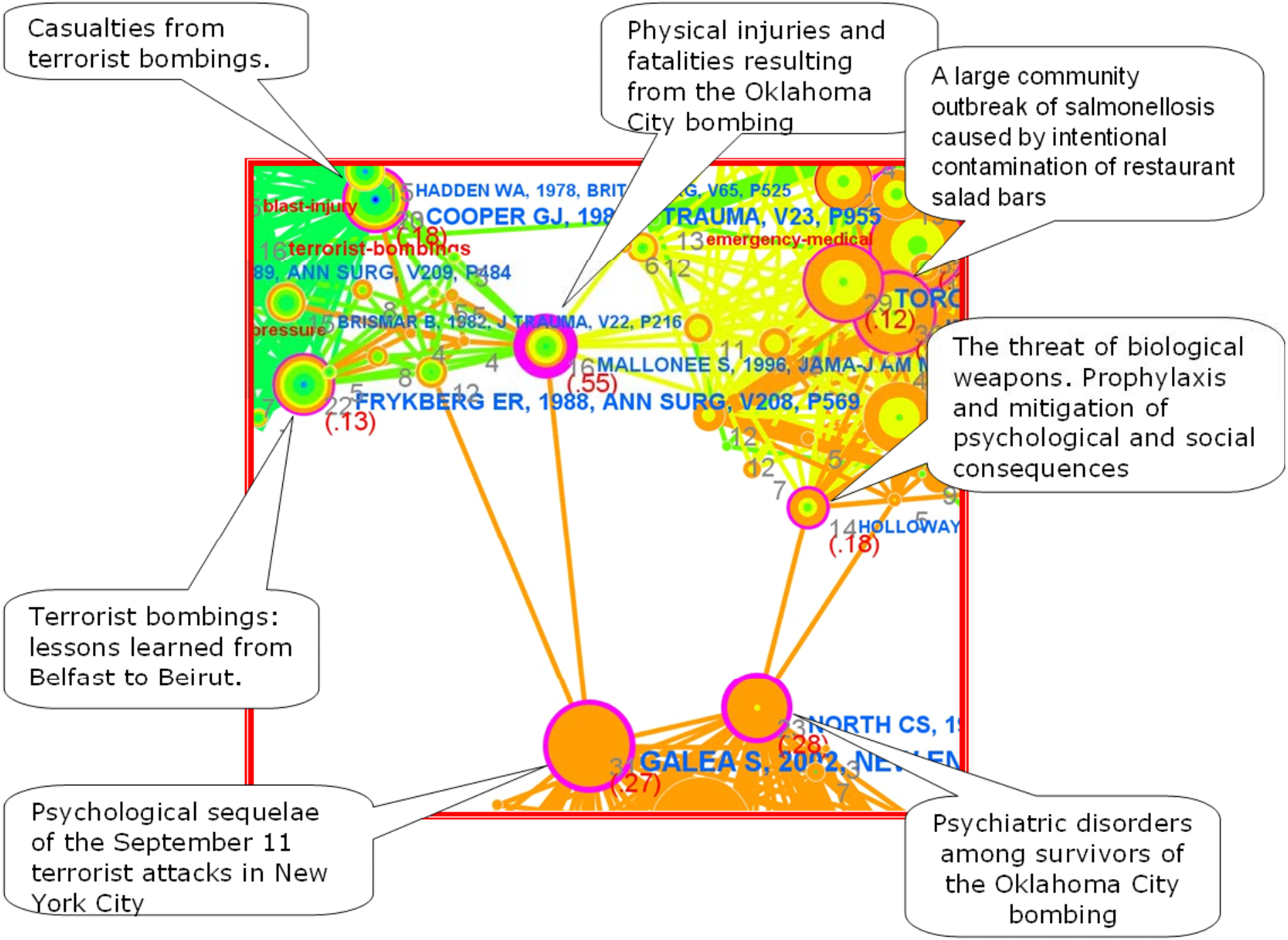
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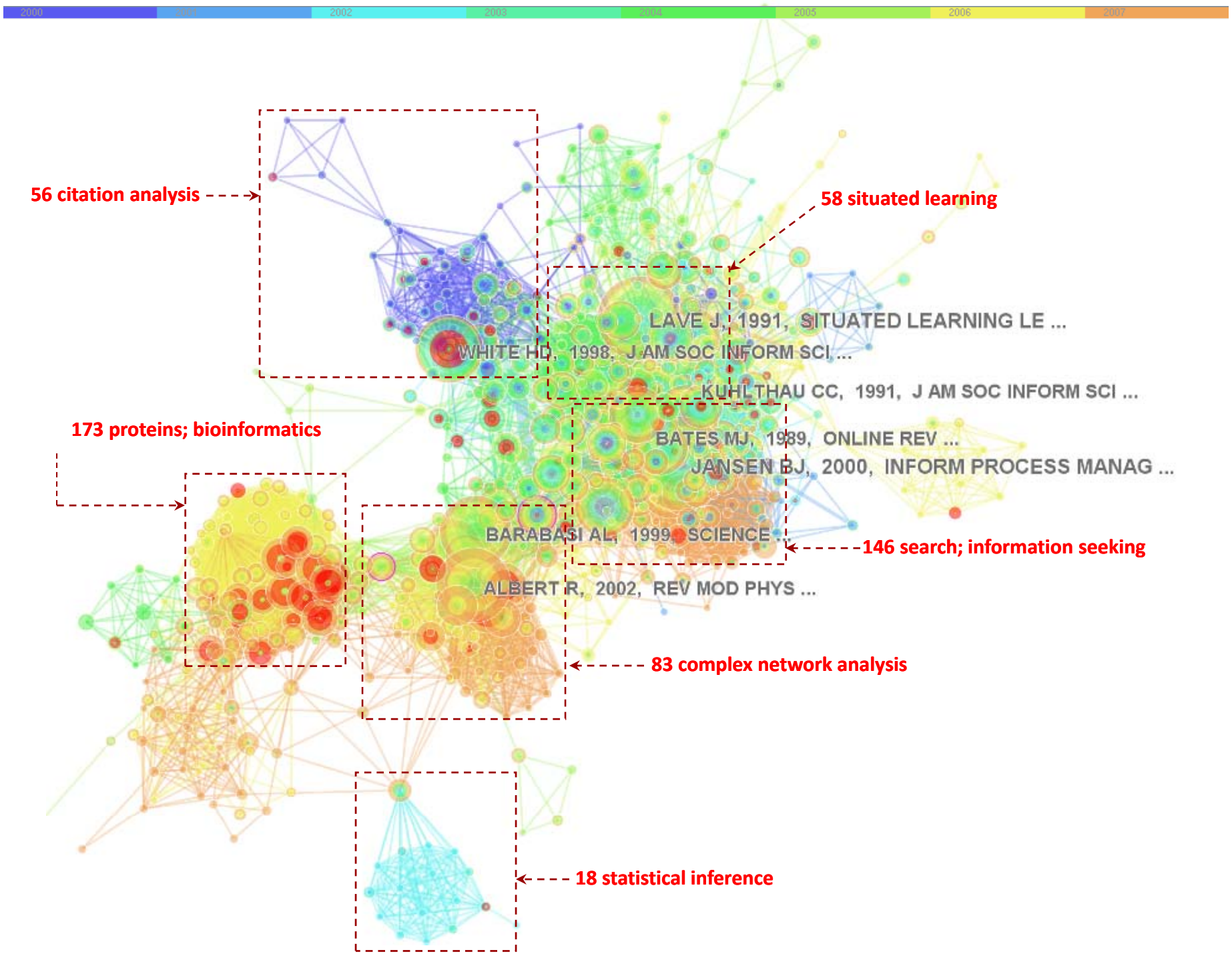
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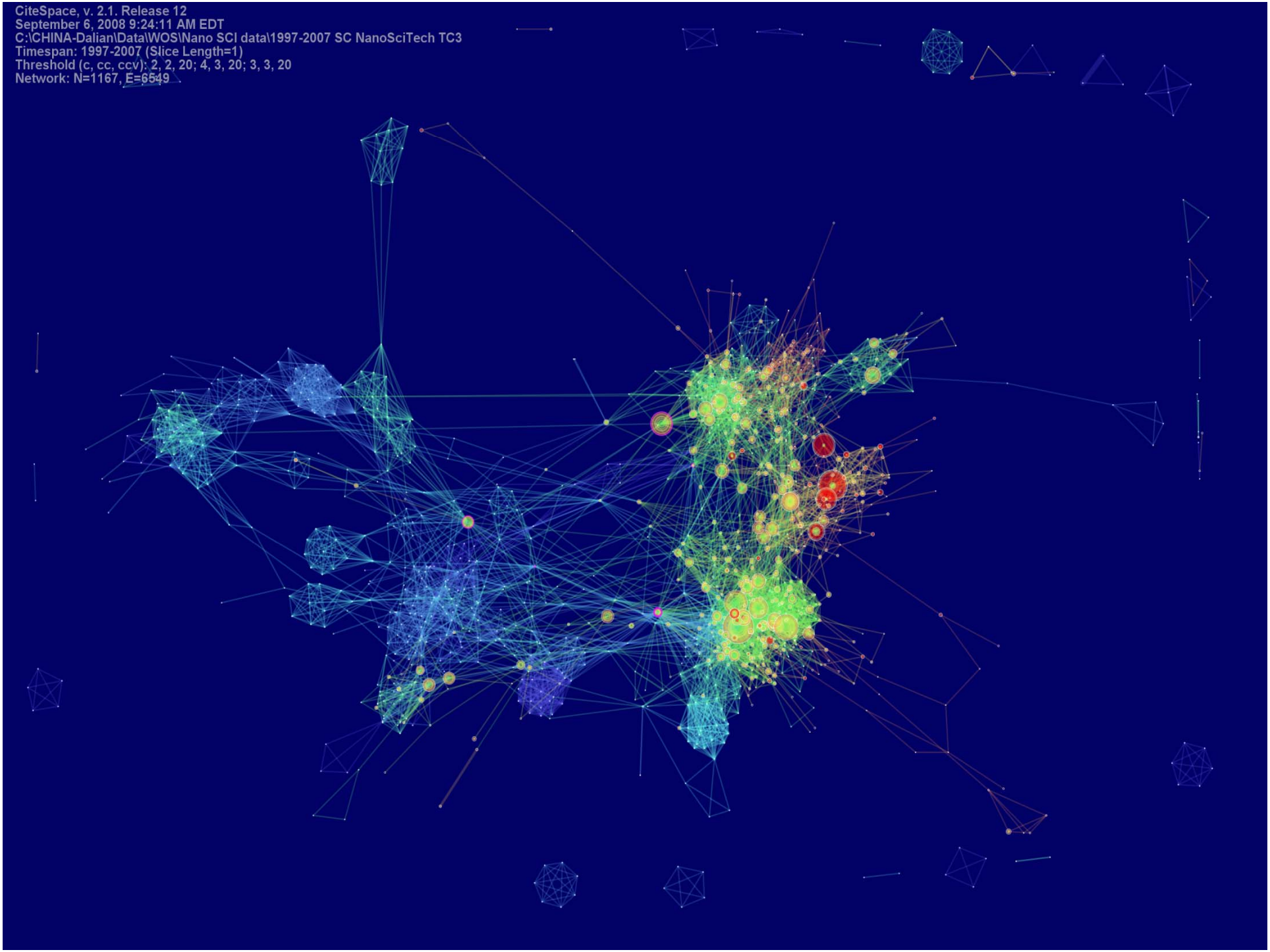
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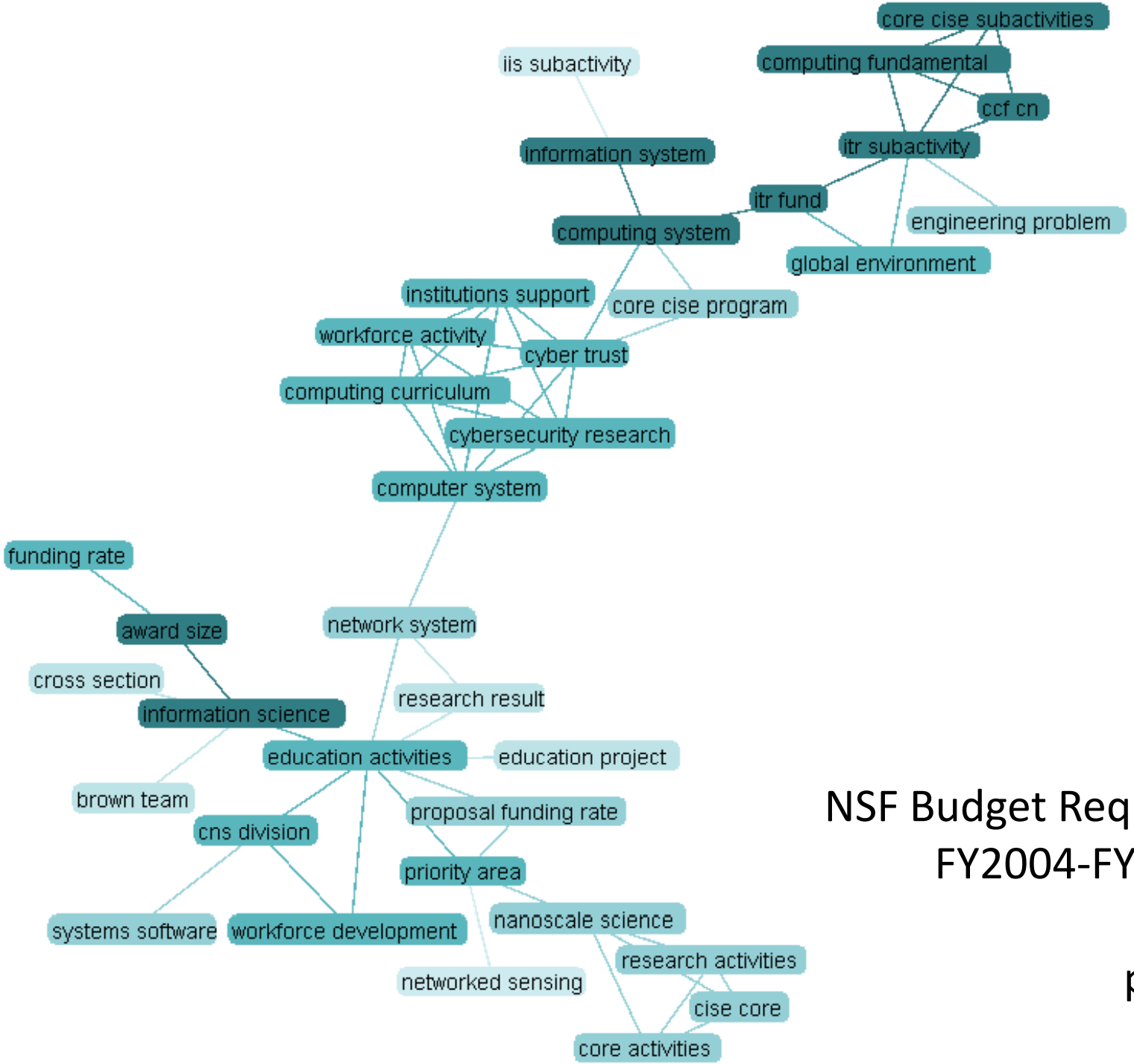

NSF Budget Requests
FY2004-FY2008
CISE
p=0.5

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Journal of Informetrics

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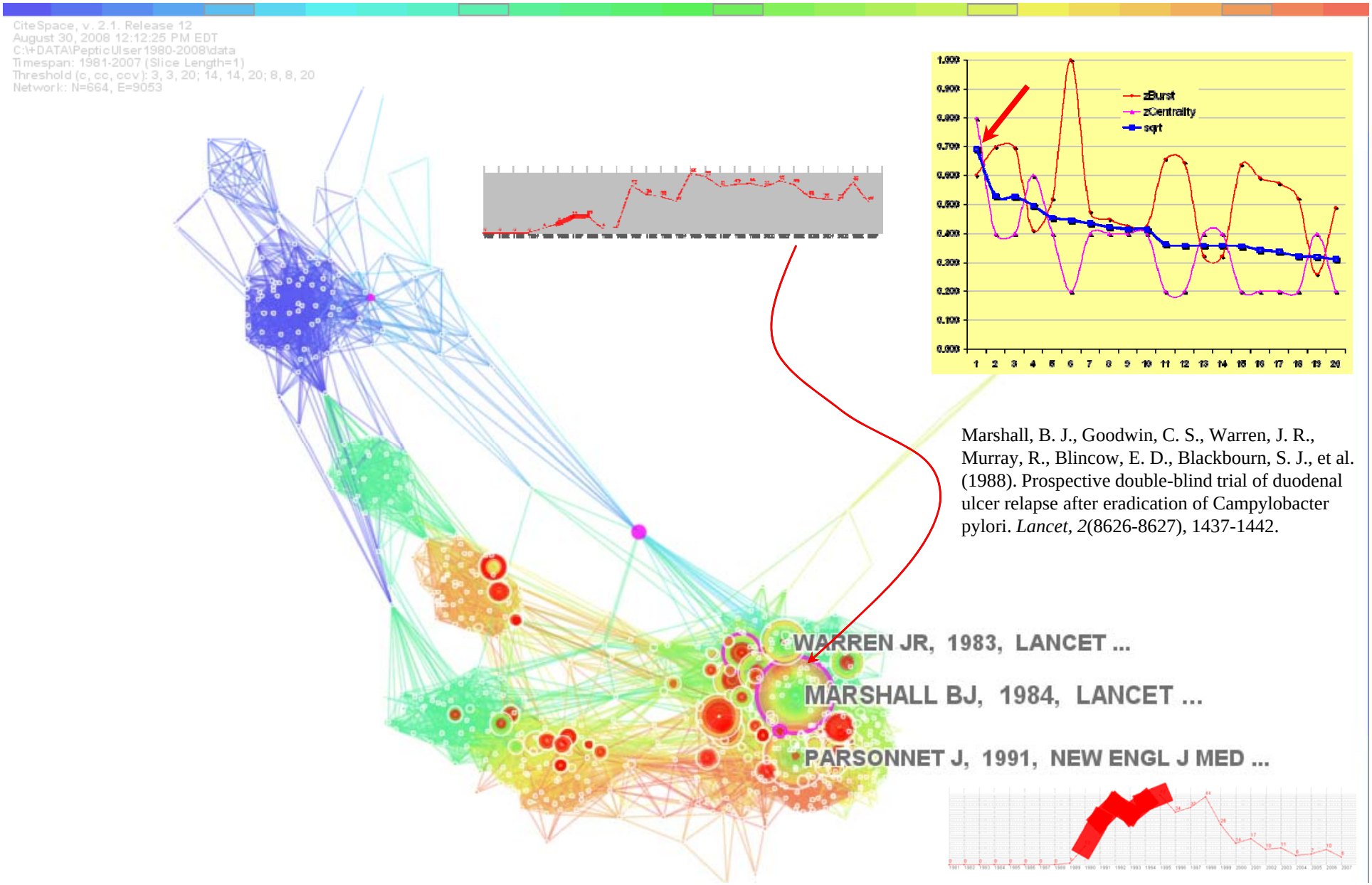
Towards an explanatory and computational theory of scientific discovery☆

Chaomei Chen[a,b,*], Yue Chen[b], Mark Horowitz[a], Haiyan Hou[b], Zeyuan Liu[b], Donald Pellegrino[a]

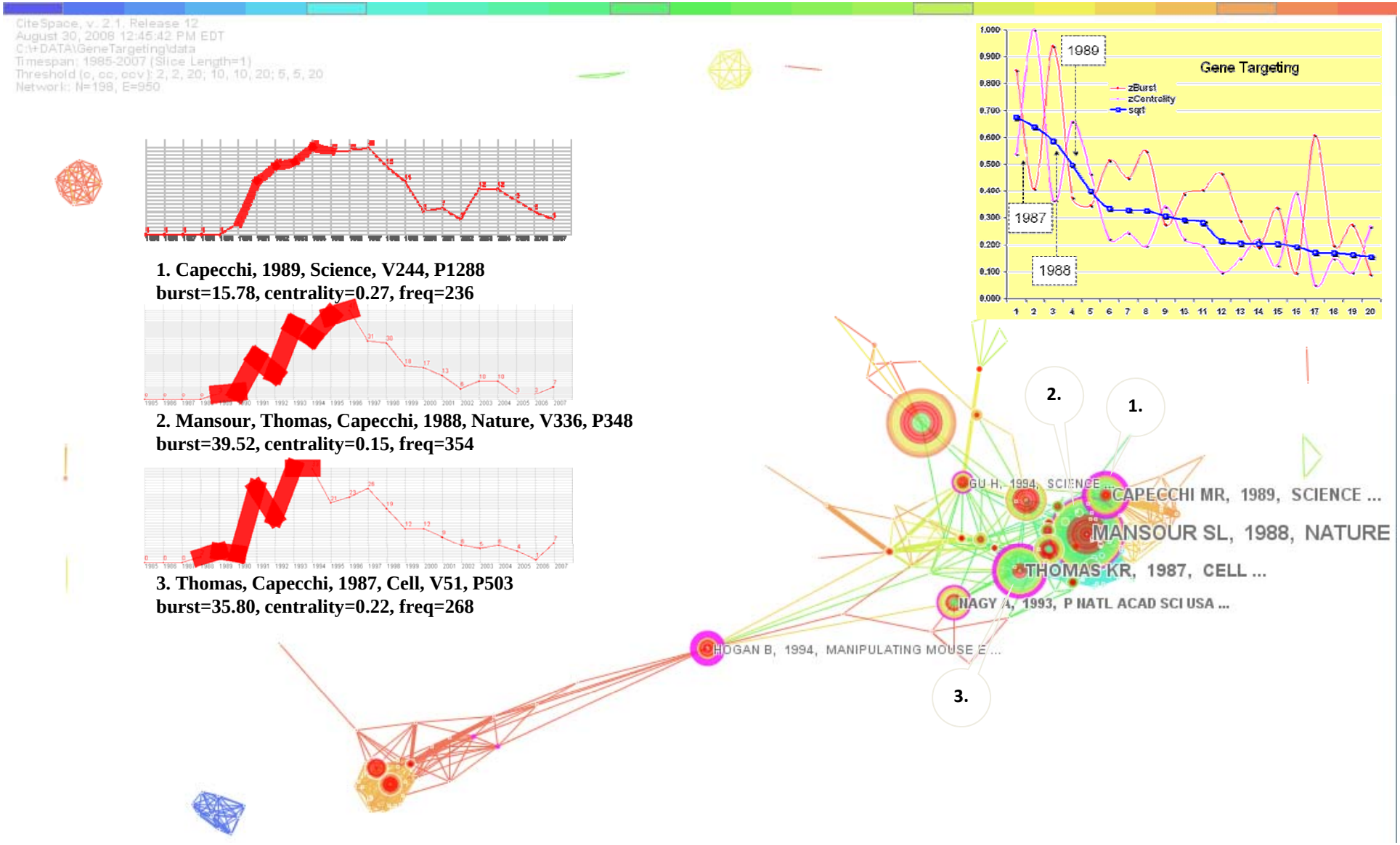
[a] College of Information Science and Technology, Drexel University, USA
[b] The WISE Lab, Dalian University of Technology, China

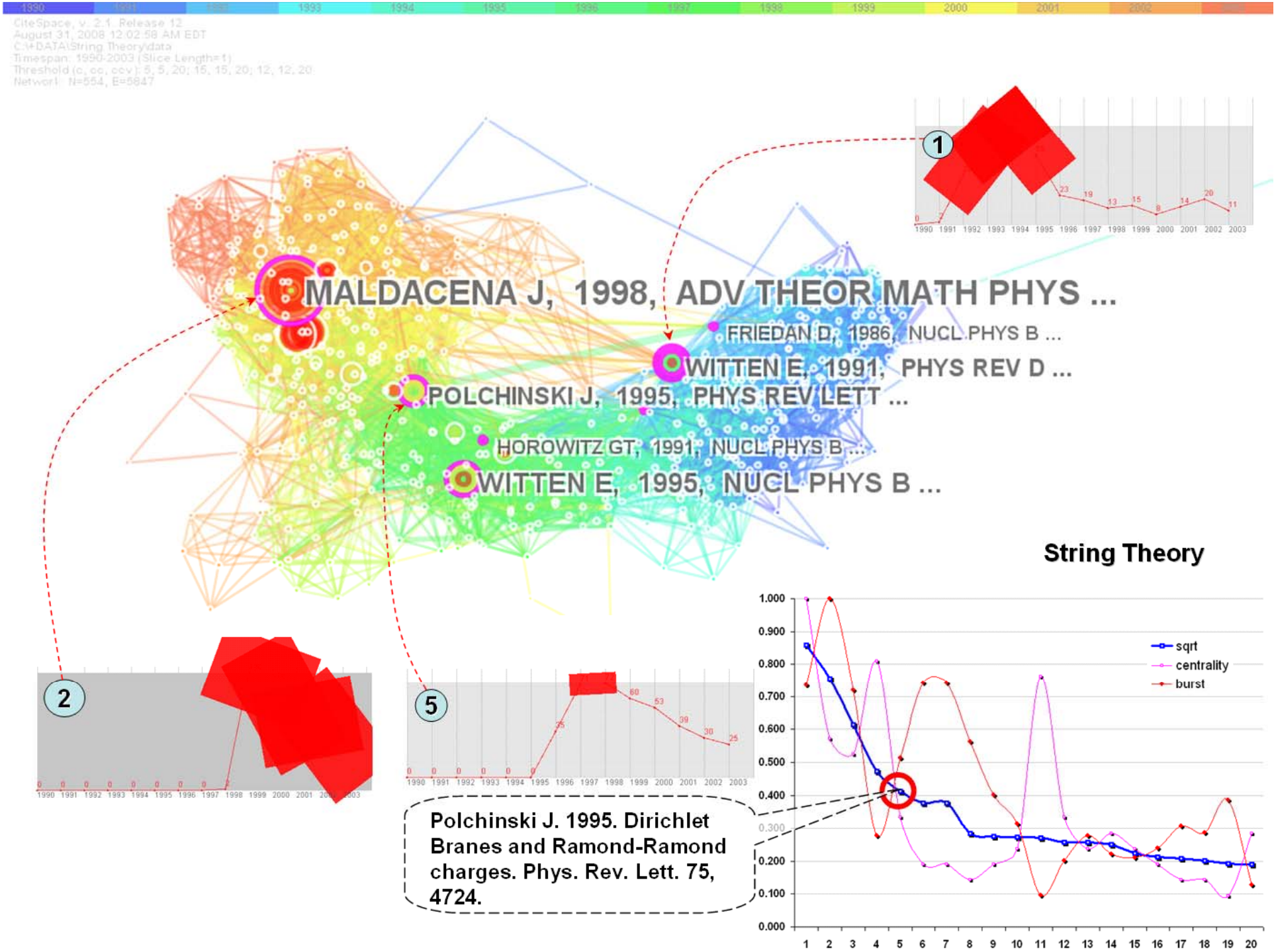
The 2005 Nobel Prize in Medicine to Barry J. Marshall and J. Robin Warren for their discovery of "the bacterium *Helicobacter pylori* and its role in gastritis and peptic ulcer disease."



Marshall, B. J., Goodwin, C. S., Warren, J. R., Murray, R., Blincow, E. D., Blackbourn, S. J., et al. (1988). Prospective double-blind trial of duodenal ulcer relapse after eradication of Campylobacter pylori. *Lancet*, *2*(8626-8627), 1437-1442.

The 2007 Nobel Prize in Medicine to Mario R. Capecchi, Martin J. Evans and Oliver Smithies for their discoveries of "*principles for introducing specific gene modifications in mice by the use of embryonic stem cells.*"

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Polchinski J. 1995. Dirichlet Branes and Ramond-Ramond charges. Phys. Rev. Lett. 75, 4724.

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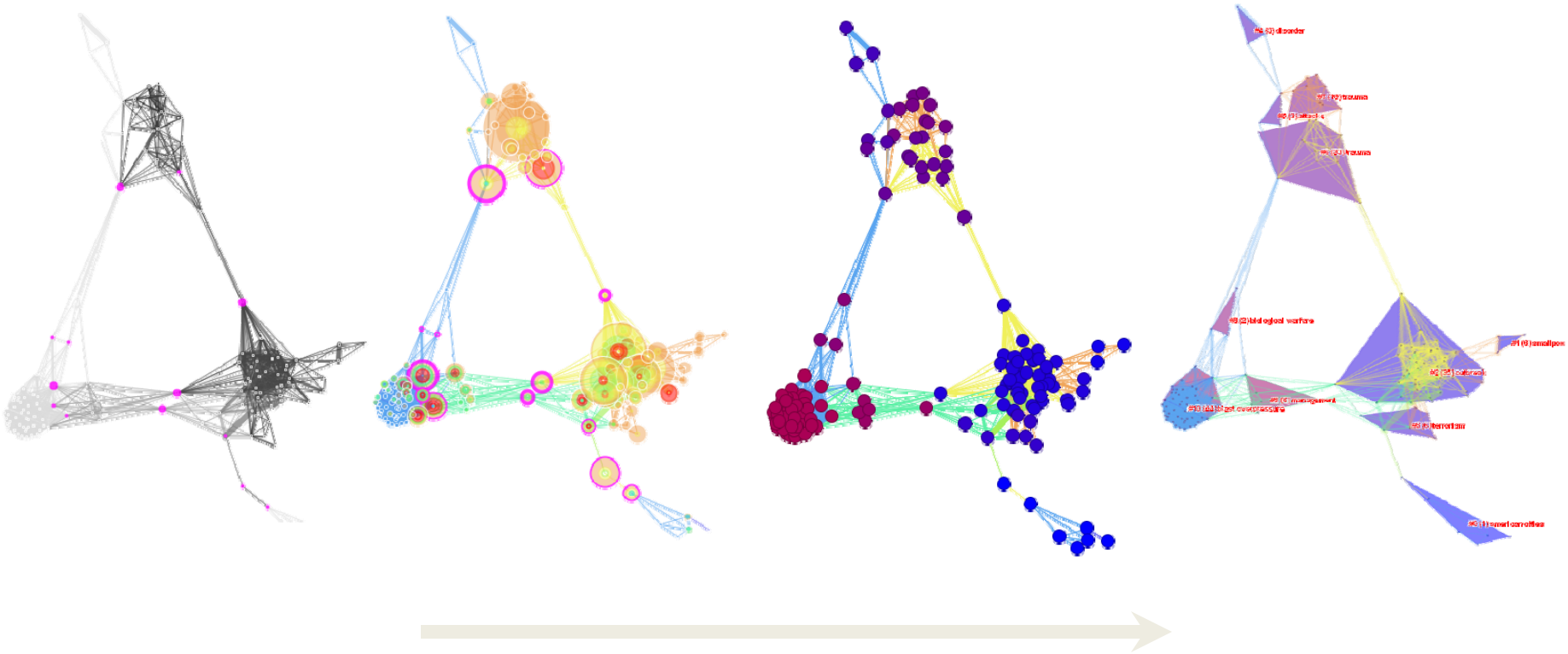


Visualization Viewpoints

Editor:
Theresa-Marie Rhyne

An Information-Theoretic View of Visual Analytics

Chaomei Chen
Drexel University

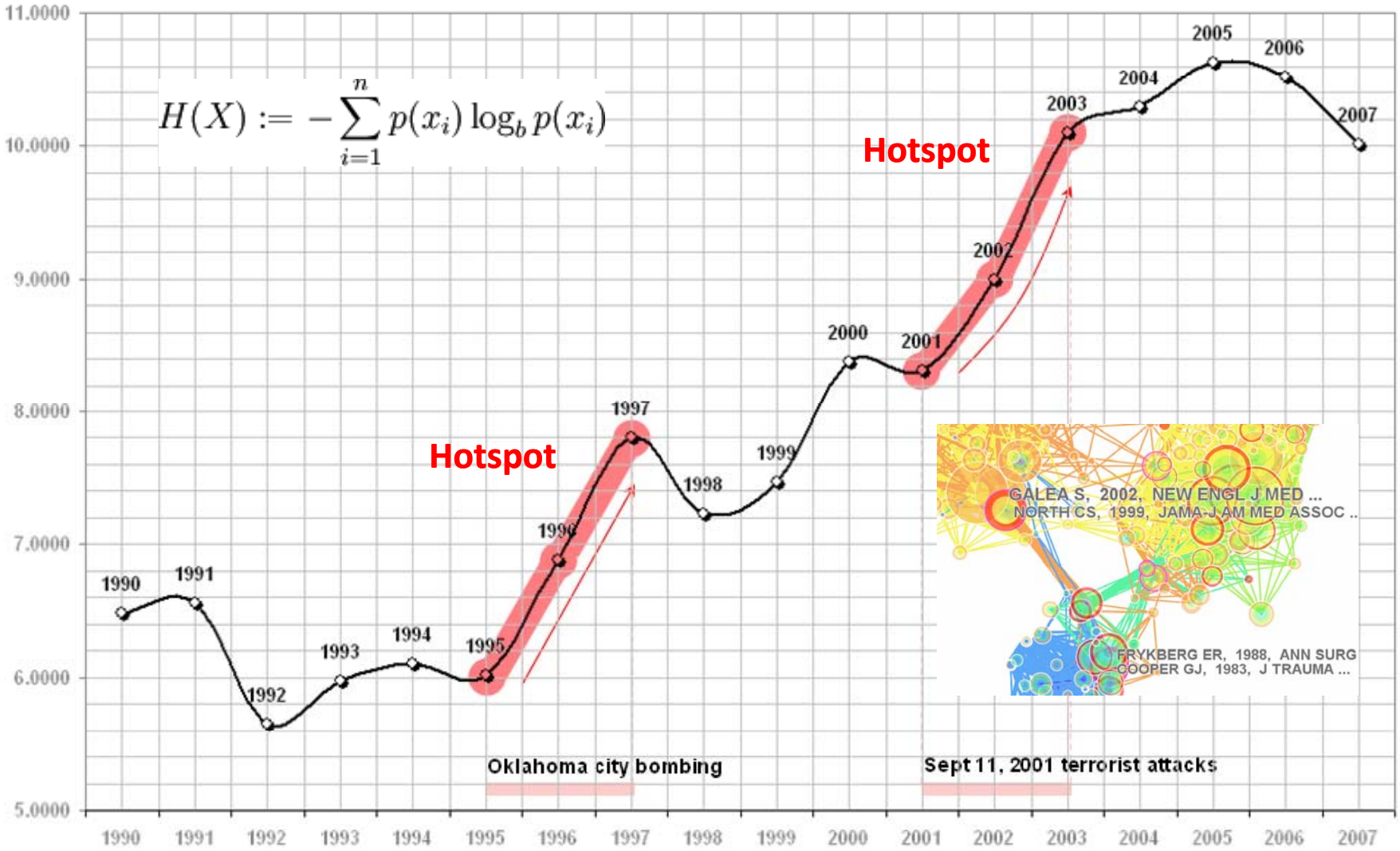
Prior to the 9/11 terrorist attacks, several foreign nationals enrolled in US civilian flying schools to learn how to fly large commercial aircraft. They wanted to learn how to navigate civilian airlines, but they were not interested in landings or takeoffs. They all paid cash for the lessons. So, the 9/11 investigations raised questions about whether intelligence agencies could have connected the dots and prevented the attacks.[1] But how do you connect these seemingly isolated dots and reveal the hidden story?

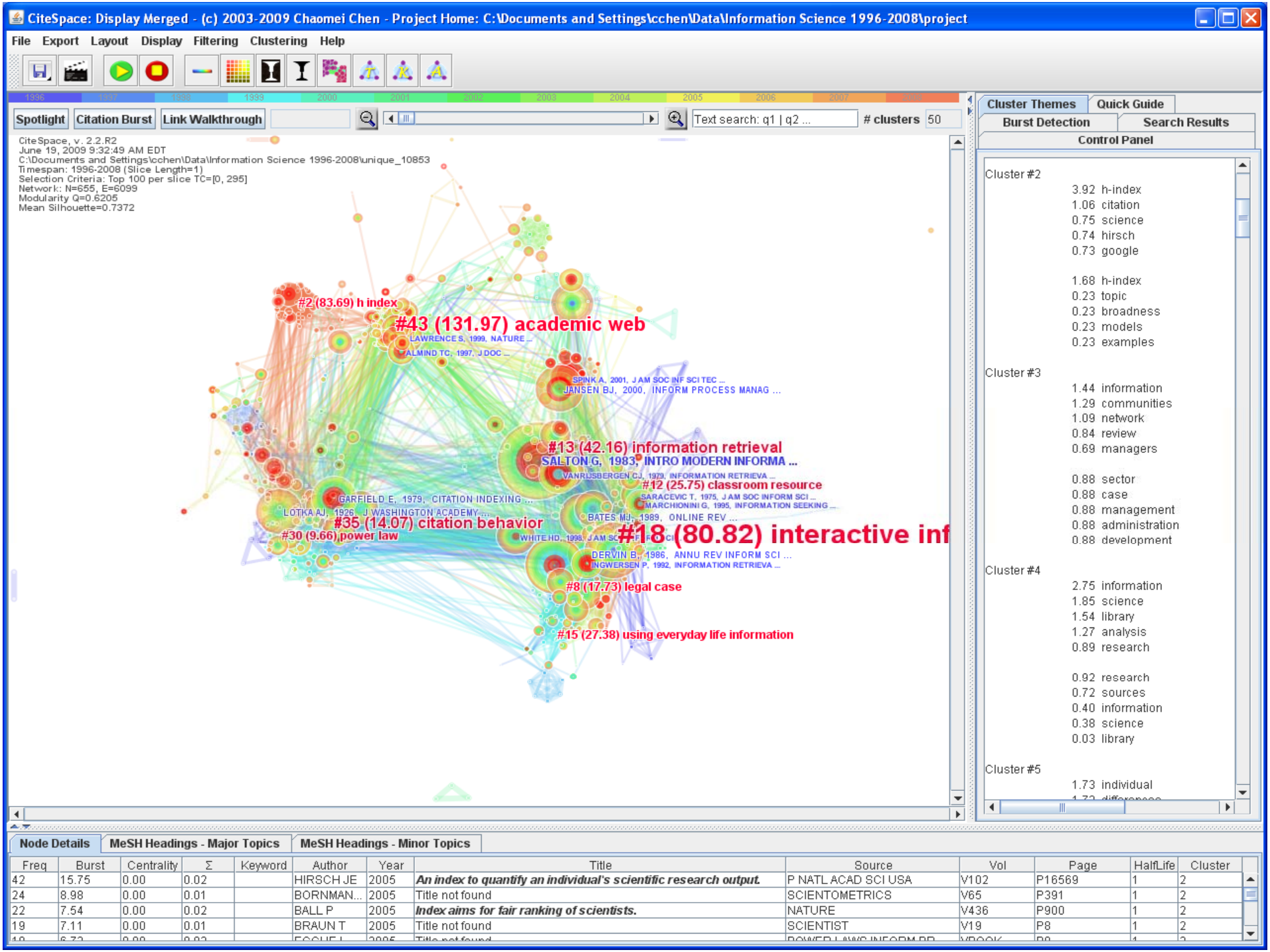
tion. We can view information entropy as the divergence from a uniform distribution. This is consistent with the common interpretation of information entropy as a measure of uncertainty, or lack of uniformity.

A useful alternative interpretation of the K-L divergence is the expected extra message length the communication entails if the message is transmitted without using a coding scheme based on the true distribution. In computer science, an object's *Kolmogorov complexity*, also known as algorithmic entropy or program-size com-

‘Profitability’ of Information Contents

Information Entropy (Vocabulary)





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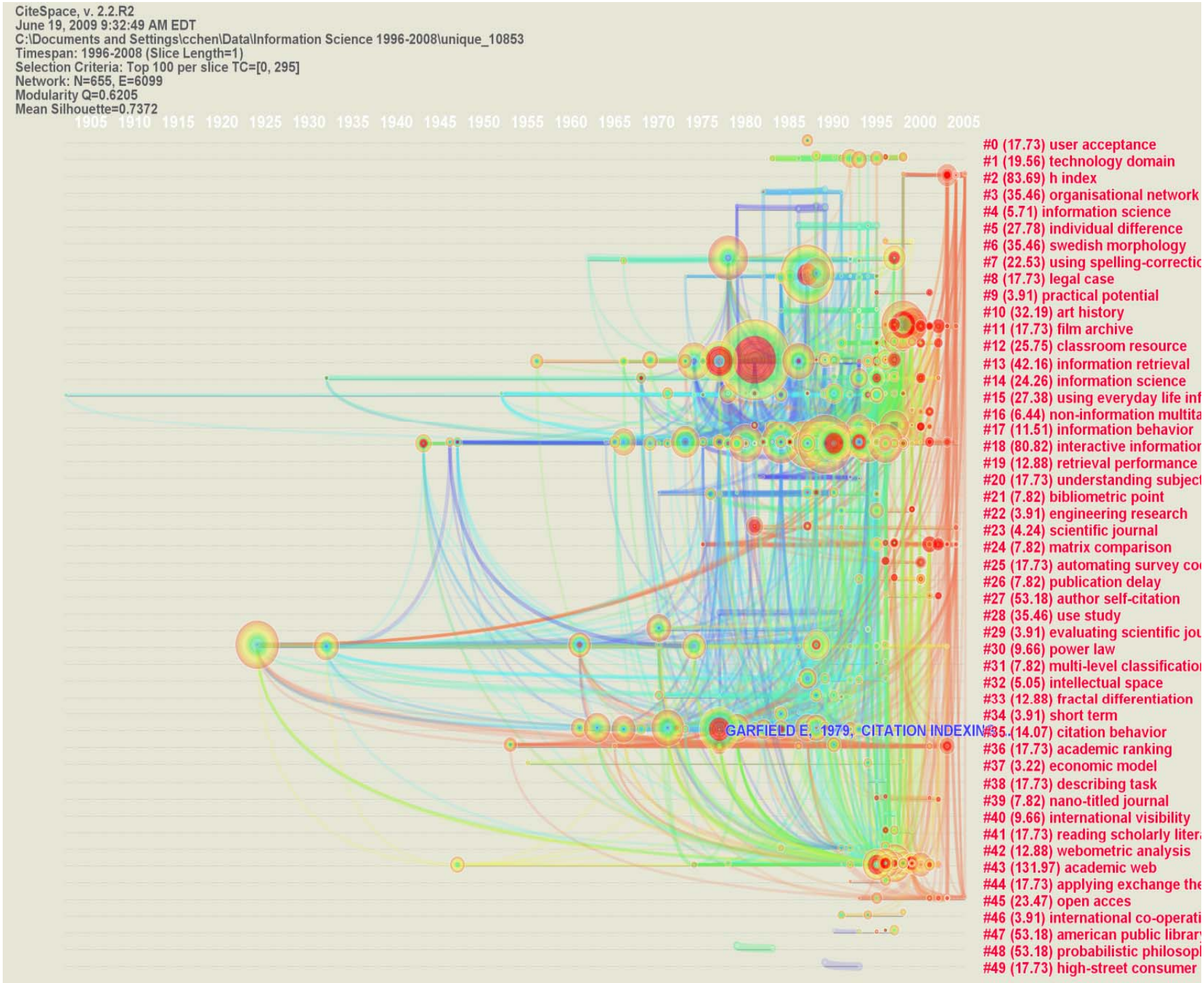
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#4 (5.71) information science
#5 (27.78) individual difference
#6 (35.46) swedish morphology
#7 (22.53) using spelling-correctio
#8 (17.73) legal case
#9 (3.91) practical potential
#10 (32.19) art history
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#12 (25.75) classroom resource
#13 (42.16) information retrieval
#14 (24.26) information science
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GARFIELD E., 1979, CITATION INDEXING
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QUESTIONS AND DISCUSSIONS