

INFO 319

Demo & Exercise: Scientometric Analysis



- Assignment
 - Divide into groups
 - Pick a “science of science” research question
 - Example domain: *Resilience in the Context of Emergency Management*
 - What are core concepts in the scientific literature and how are these concepts related?
 - Which subject domains contribute to resilience research and what patterns exist in their relationships?
 - Have there been pronounced shifts in this domain in the last five years, a compared to the five-year period before that?
 - ...
 - Obtain scientific publications (metadata & content)
 - Perform network and/or content analysis
 - Perform visual analytics to highlight major structures
 - Fri pm: Present to the class, highlighting results, problems, solutions

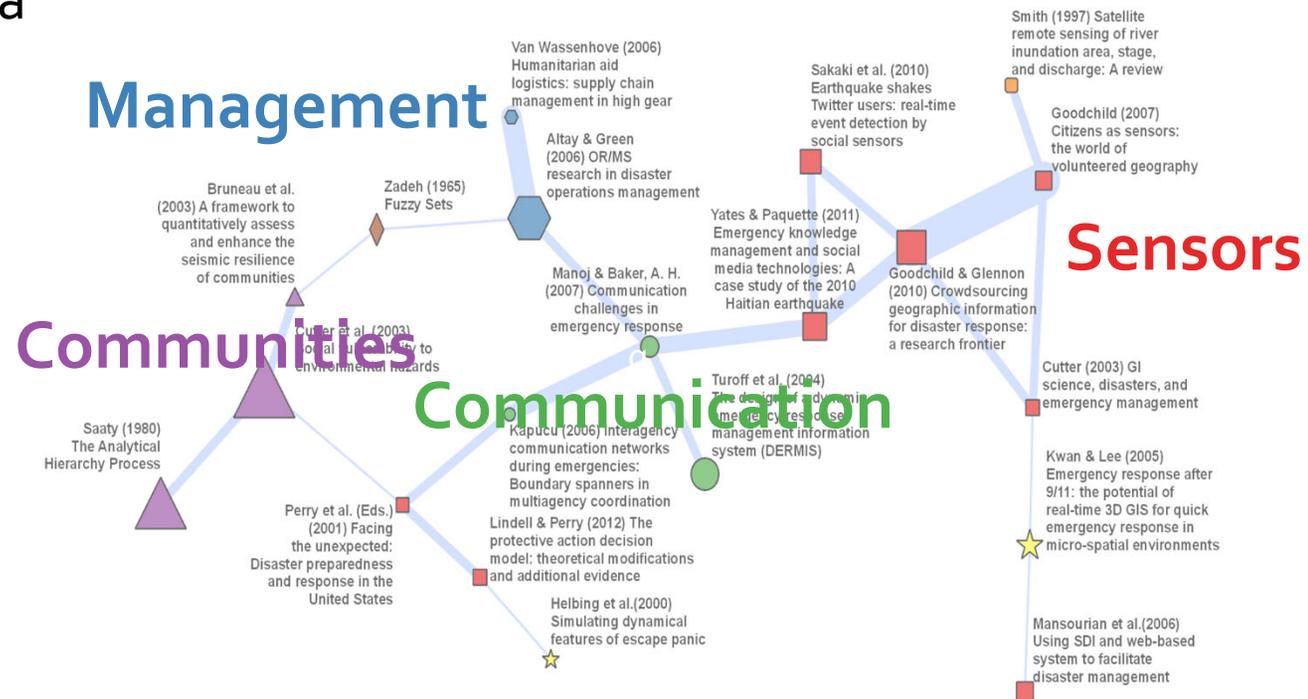
INFO 319

Demo & Exercise: Scientometric Analysis



■ Workflow

- 1. Search bibliometric database
- 2. Export publication data
- 3. Network extraction
- 4. Network processing
- 5. Graph layout
- 6. Symbolization



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Example: TS=(nanotub* AND carbon) NOT AU=Smalley RE
#1 NOT #2 [more examples](#) | [view the tutorial](#)

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Restrict results by languages and document types:

- | | |
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| English | Article |
| Afrikaans | Abstract of Published Item |
| Arabic | Art Exhibit Review |

Booleans: AND, OR, NOT, SAME, NEAR

Field Tags:

- | | |
|-----------------------------------|-----------------------------|
| TS= Topic | SA= Street Address |
| TI= Title | CI= City |
| AU= Author [Index] | PS= Province/State |
| AI= Author Identifiers | CU= Country/Region |
| GP= Group Author [Index] | ZP= Zip/Postal Code |
| ED= Editor | FO= Funding Agency |
| SO= Publication Name [Index] | FG= Grant Number |
| DO= DOI | FT= Funding Text |
| PY= Year Published | SU= Research Area |
| AD= Address | WC= Web of Science Category |
| OG= Organization-Enhanced [Index] | IS= ISSN/ISBN |
| OO= Organization | UT= Accession Number |
| SG= Suborganization | PMID= PubMed ID |
| | ALL= All Fields |

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Restrict results by languages and document types:

| | |
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| All languages | All document types |
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| ED= Editor | FO= Funding Agency |
| SO= Publication Name [Index] | FG= Grant Number |
| DO= DOI | FT= Funding Text |
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| OO= Organization | UT= Accession Number |
| SG= Suborganization | PMID= PubMed ID |
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By: Antunes, Francisco; Amorim, Marco; Pereira, Francisco C.; et al.

SIMULATION MODELLING PRACTICE AND THEORY Volume: 97 Article Number: 101947 Published: DEC 2019

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By: Chen, J
IEEE TRAN
2020

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By: Antune
SIMULATIO

3. Integrating location and network restoration decisions in relief networks under uncertainty

By: Sancı, Ece; Daskin, Mark S.
EUROPEAN JOURNAL OF OPERATIONAL RESEARCH Volume: 279 Issue: 2 Pages: 335-350 Published: DEC 1
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PT J

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Touati, C

Zhu, QY

AF Chen, Juntao

Touati, Corinne

Zhu, Quanyan

TI A Dynamic Game Approach to Strategic Design of Secure and Resilient
Infrastructure Network

SO IEEE TRANSACTIONS ON INFORMATION FORENSICS AND SECURITY

LA English

DT Article

DE Dynamic games; security; resilience; infrastructure networks; subgame
perfect equilibrium

ID ATTACKS; SYSTEMS; DEFENSE

AB Infrastructure networks are vulnerable to both cyber and physical attacks
providing reliable and dependable services. To this end, we establish a two-p
the infrastructure protection and recovery phases. Specifically, the goal of th
connected before and after the attack, while the adversary aims to disconnec
creating and removing links, the two players aim to maximize their utilities w
subgame perfect equilibrium (SPE) to characterize the optimal strategies of t

C1 [Chen, Juntao; Zhu, Quanyan] NYU, Dept Elect & Comp Engr, T
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EM jc6412@nyu.edu; corinne.touati@inria.fr; qz494@nyu.edu

FU National Science Foundation (NSF)National Science Foundation
[SES-1541164, ECCS-1847056]; U.S. Department of Homeland Se

States Department of Homeland Security (DHS) [2015-ST-061-CI

FX This work was supported in part by the National Science Founda
under Grant SES-1541164 and Grant ECCS-1847056, and in part b

Department of Homeland Security under Grant 2015-ST-061-CIR

associate editor coordinating the review of this manuscript and
approving it for publication was Dr. Shantanu D. Rane. (Correspon

author: Juntao Chen.)

CR Al-kahtani M. S., 2012, P 6 INT C SIGN PROC, P1, DOI [10.1109/I
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Chen J., IEEE T CONTROL NETW, DOI [10.1109/TCNS.2019.29068
CHEN J, 2017, IEEE WCNC

Scientometric Network Analysis Network Extraction & Processing: *Sci2 Tool*



Sci2 Tool
A Tool for Science of Science Research & Practice

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News

2018

- Jan 31, The [Sci2 \(Science of Science\) Tool v1.3](#) release provides support for Java 1.9 and removes deprecated plugins.

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1 / 4 Start Stop

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Scientometric Network Analysis

Network Extraction & Processing: *Sci2 Tool*



Sci2 Tool

File Data Preparation Preprocessing Analysis Modeling Visualization R Help

Console

Weight: weight
Centrality Attribute Name: betweenness_centrality

.....
Fast Pathfinder Network Scaling was selected.
Implementer(s): Chintan Tank
Integrator(s): Chintan Tank
Documentation:
<http://wiki.slis.indiana.edu:8080/display/ALGDOC/Fast+Pathfinder+Network+Scaling>

Input Parameters:
Weight Attribute measures: SIMILARITY
Edge Weight Attribute: weight
Value of R parameter: 1.0
Value of R parameter = Infinity?: true
For undirected networks, use MST Pathfinder network scaling algorithm for faster results.

.....
Gephi was selected.
Author(s): The Gephi Consortium
Integrator(s): David M. Coe

Scheduler

Remove From List Remove completed automatically Remove all completed

| ! | Algorithm Name | Date | Time | % Complete |
|-------------------------------------|------------------------|------------|--------------|---|
| <input checked="" type="checkbox"/> | Gephi | 10/23/2019 | 09:12:36 ... | <div style="width: 100%; height: 10px; background-color: green;"></div> |
| <input checked="" type="checkbox"/> | Fast Pathfinder Net... | 10/23/2019 | 09:12:22 ... | <div style="width: 100%; height: 10px; background-color: green;"></div> |
| <input checked="" type="checkbox"/> | Node Betweenness... | 10/23/2019 | 09:12:08 ... | <div style="width: 100%; height: 10px; background-color: green;"></div> |
| <input checked="" type="checkbox"/> | Blondel Communit... | 10/23/2019 | 09:11:30 ... | <div style="width: 100%; height: 10px; background-color: green;"></div> |
| <input checked="" type="checkbox"/> | GUESS | 10/23/2019 | 09:09:27 ... | <div style="width: 100%; height: 10px; background-color: green;"></div> |
| <input checked="" type="checkbox"/> | MST-Pathfinder Ne... | 10/23/2019 | 09:09:10 ... | <div style="width: 100%; height: 10px; background-color: green;"></div> |
| <input checked="" type="checkbox"/> | Extract Co-Occurre... | 10/23/2019 | 09:08:11 ... | <div style="width: 100%; height: 10px; background-color: green;"></div> |
| <input checked="" type="checkbox"/> | MST-Pathfinder Ne... | 10/23/2019 | 09:07:15 ... | <div style="width: 100%; height: 10px; background-color: green;"></div> |
| <input checked="" type="checkbox"/> | Extract Co-Occurre... | 10/23/2019 | 09:06:11 ... | <div style="width: 100%; height: 10px; background-color: green;"></div> |
| <input checked="" type="checkbox"/> | Extract Co-Author ... | 10/23/2019 | 09:05:12 ... | <div style="width: 100%; height: 10px; background-color: green;"></div> |
| <input checked="" type="checkbox"/> | Extract Document | 10/23/2019 | 09:04:57 ... | <div style="width: 100%; height: 10px; background-color: green;"></div> |

Data Manager

- ISI Data: D:\askupin\Teaching\Workshops\Bergen_2019\Exercise\BDEM_WoS_2019.txt
 - 656 Unique ISI Records
 - Extracted paper-citation network
 - Graph and Network Analysis Log
 - Co-citation Similarity Network
 - Paper information
 - Extracted Co-Authorship Network
 - Author information
 - Merge Table: based on Subject Category
 - Extracted Network on Column Subject Category
 - With community attributes
 - With 'betweenness_centrality' as the Betweenness Centrality
 - Fast Pathfinder Network Scaling used weight SIMILARITY & value of r = Infinity to reduce 117 edges to 65. Scaling ratio = 1.8
 - Merge Table: based on Subject Category.2

Workflow Manager

- Workflow 1
 - Load...
 - Extract Paper Citation Network
 - Network Analysis Toolkit (NAT)
 - Extract Co-Author Network
 - Parameters
 - Extract Document Co-Citation Network
 - Extract Co-Occurrence Network
 - Parameters
 - Extract Co-Occurrence Network
 - Parameters
 - MST-Pathfinder Network Scaling
 - Parameters
 - GUESS
 - Blondel Community Detection
 - Parameters

Scientometric Network Analysis

Graph Layout: Gephi

