

Representing Cyberspace using taxonomies and Meta-data analysis

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Problem

- **Modeling and mapping** the landscapes of emerging research fields, such as cyberspace.
- Most research fields are composed of many **subfields which are related in intricate ways**, therefore **structural organization** of these subfields could be of great use.
- Acquiring and analyzing such knowledge is hampered by the **vast amount of data** available in publications.
- The need of **database integration** to enable the mapping of relevant component of the topic in hand (e.g. Cyberspace and International Relations).

Research Goals

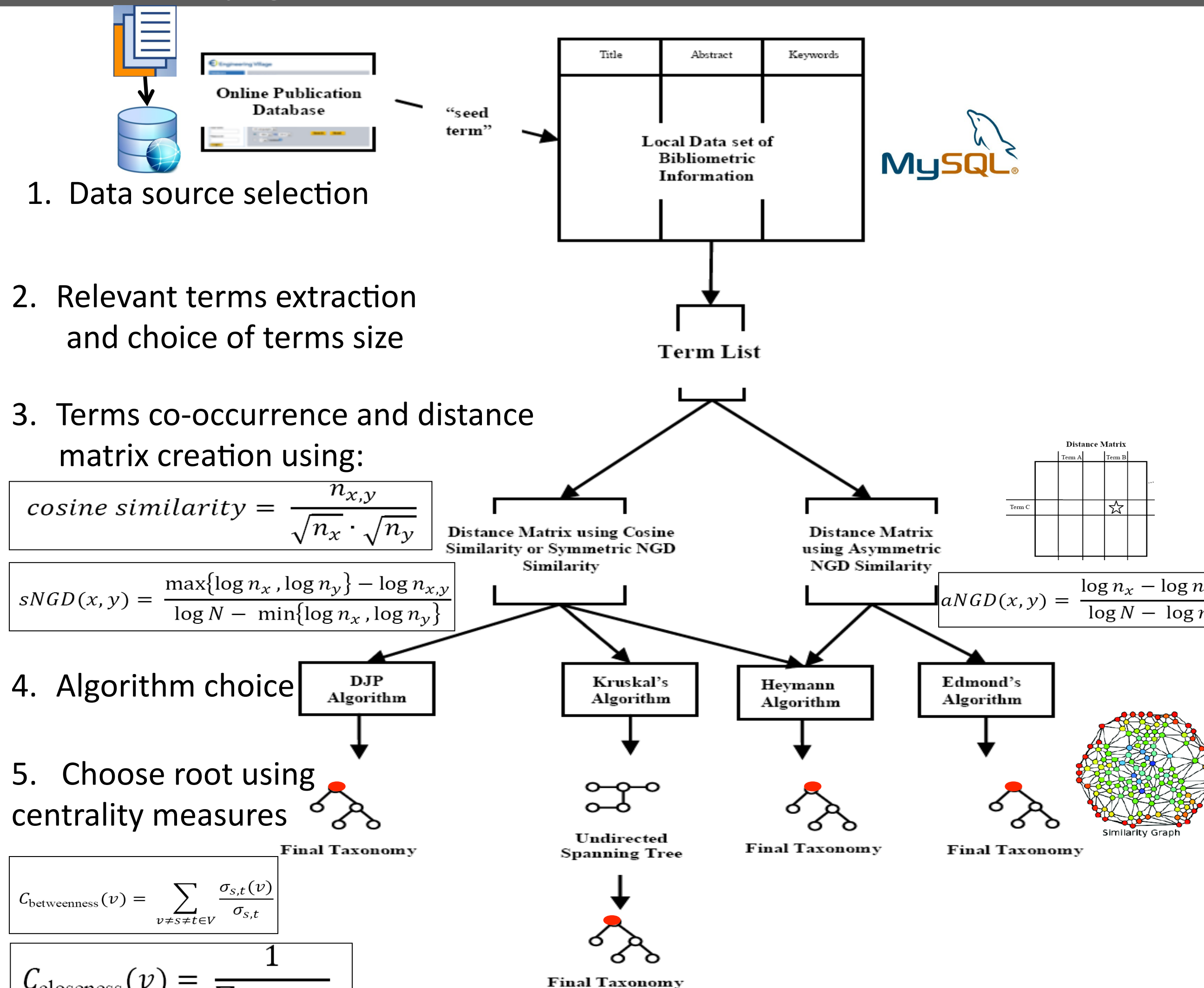
- To develop automated, publication database-independent methods for generating **taxonomies**.
- Advancing the algorithms in the sub-field of **bibliometrics**
- Applying these tools in **support of the Explorations in Cyber International Relations (ECIR) research effort**.
- **Integration of databases** of technology and social sciences to capture the whole landscape of cyberspace
- To generate ways of **visually representing** the data in a manner that is easily usable and understandable for end users.

Current Activities

- Providing a tool that generates and visualizes taxonomies (e.g. Cyberspace taxonomy).
- Meta data analysis to explore and compare the data of different topics (e.g. publication volume, authors affiliations,..)
- Choice and integration of relevant databases sources (e.g. identified the gap between using engineering/computer science vs. social science as the pool of publications for the purpose of the cyberspace taxonomy generation)

Methods

Taxonomy generation and visualization process:



Tool at <http://taxonomy.mit.edu/> (samples shown at the Results section)

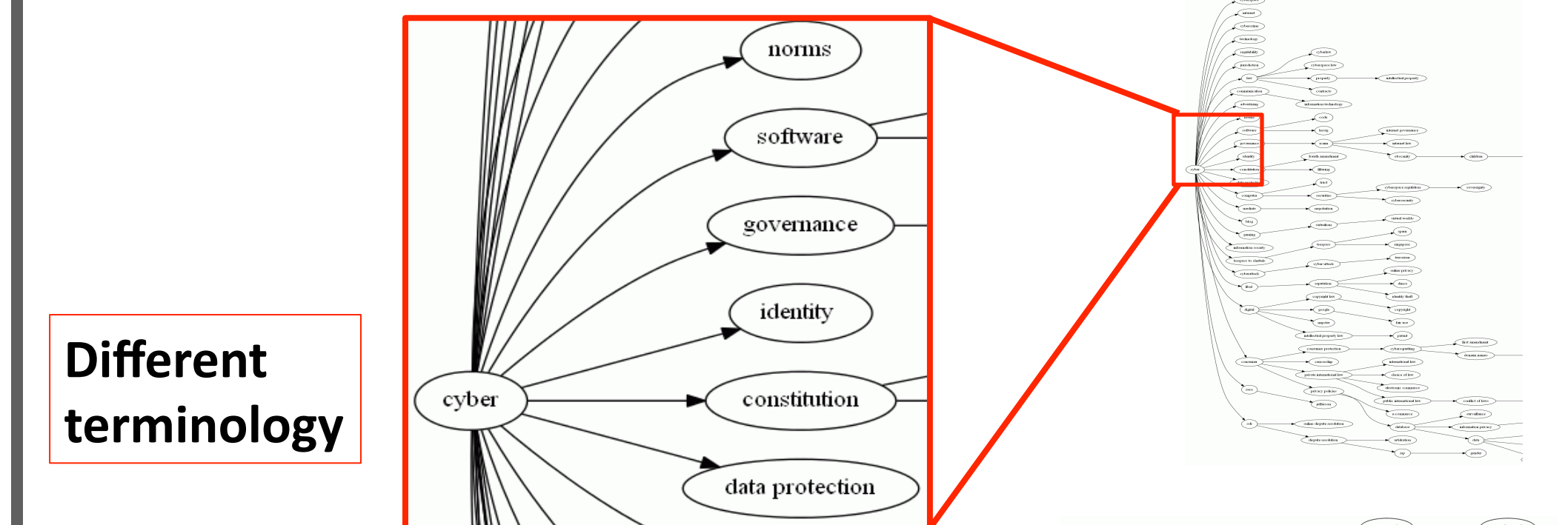
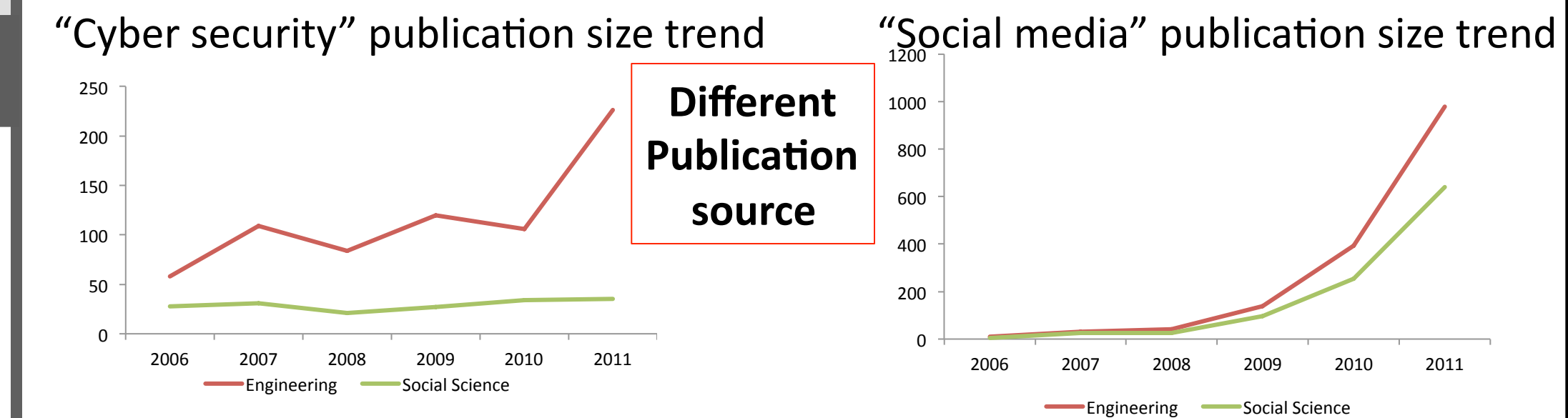
Meta data analysis:

Social Science Databases	cyberspace	cyber security	social media
Science Direct	2979	259	638
Microsoft Academic Research beta	506	24	38
JSTOR	7817	143	245
SSRN	608	85	203
SSRC	1	1	0
Engineering Databases	cyberspace	cyber security	social media
Science Direct	3433	1005	1165
Engineering Village	4920	2501	2136
Microsoft Academic Research beta	2127	435	1170

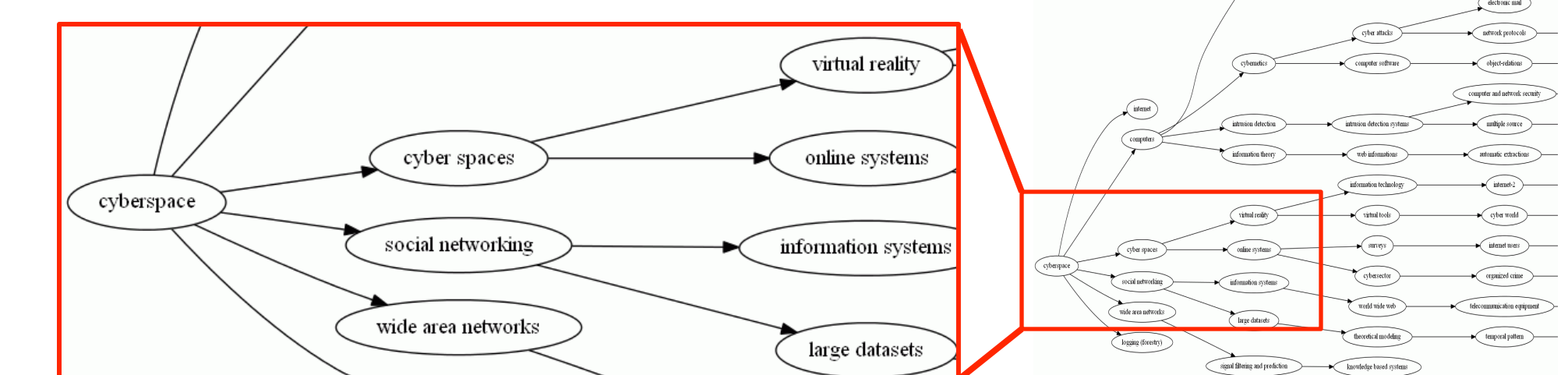
Table. 1 Shows # of records for each of the search queries "cyberspace", "cyber security", "social media" in social science vs. engineering/computer databases.

- In Table 1. the upper part shows results from the social media databases while the lower part shows data from engineering/computer databases. The numbers suggests that the social science databases are lagging behind in terms of numbers of articles on the cyber security and social media fields.
- We further use meta data from bibliographic categories including Database, Author Affiliation, Year, Country, language, etc.. for a high level exploration and comparison of different topics. (see upper part of the results section for examples)

Results



Cyberspace taxonomy generated from the social science database (SSRN)



Cyberspace taxonomy generated from the engineering village database

Summary

1. Taxonomies for scientific research bodies facilitate the organization of knowledge.
2. Size of **cyber related publications** in social science is lagging behind those from engineering/computer sciences and they contain different terminology (see Results section).
3. The integration of the relevant databases is essential (e.g. social sciences and engineering/computer) in order to cover all concepts of the field when modeling/mapping a cyber International Relation field.
4. Standardization of the quality of the meta data provided by online databases is necessary for data analysis.

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