

An Exploratory Study on Co-word Network Simulation

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Motivation

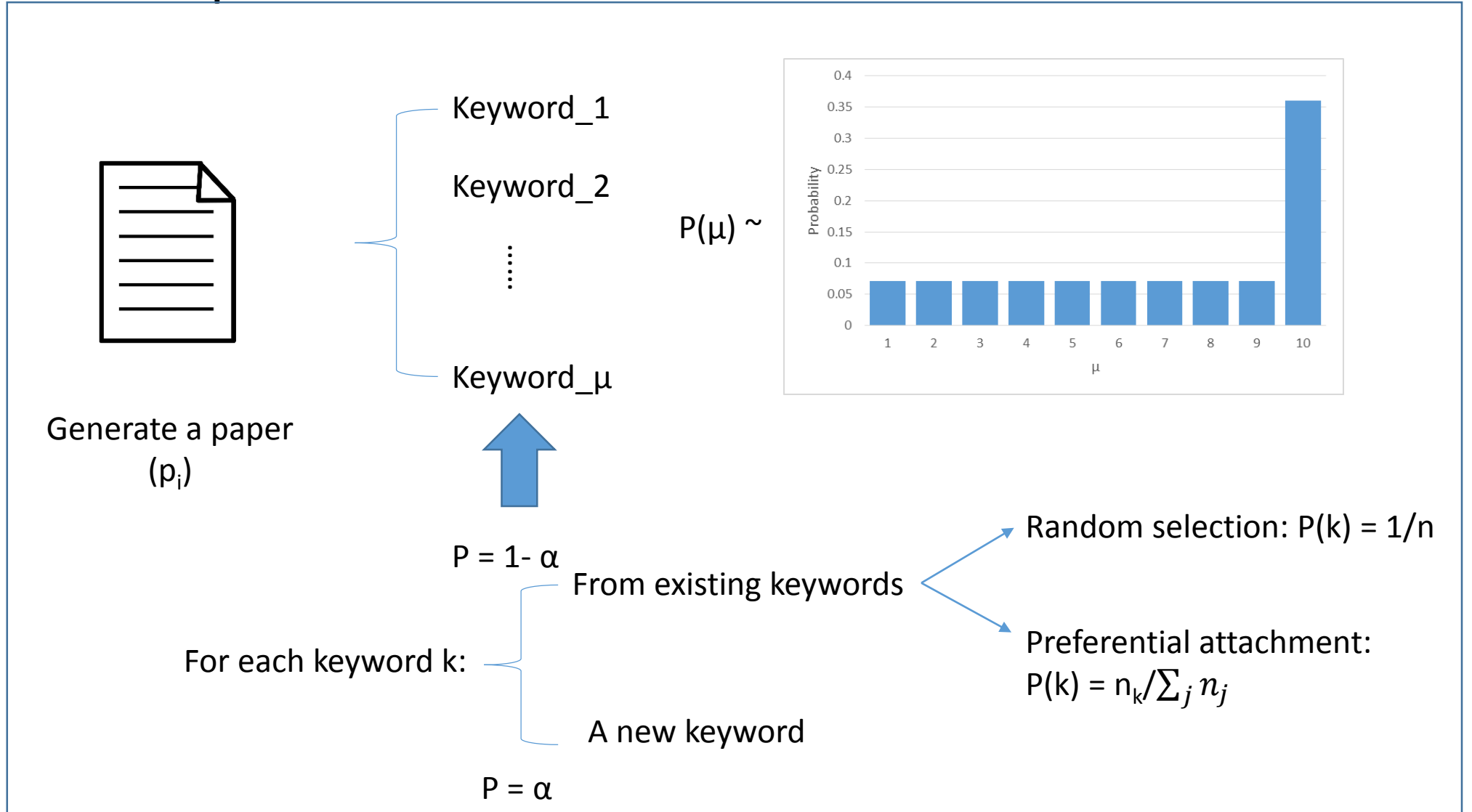
- Co-word analysis, network-based metrics
- Empirical studies
 - Collect data from a handful disciplines from Web of Science
 - Observe the relationship among different metrics on empirical networks
- Problems
 - Small number of co-word networks
 - Empirical observation is posterior, little predictive power
 - Sample may not be representative, little generalizability
 - Little understanding of the innate mechanism of co-word network

Simulation method

- Consider the generative process of a co-word network
- Infinite number of samples can be generated once the process is established
- Parameters are adjustable to observe the behavior of co-word network under different situations
- Provide insights into the innate mechanisms of co-word networks

Generative process

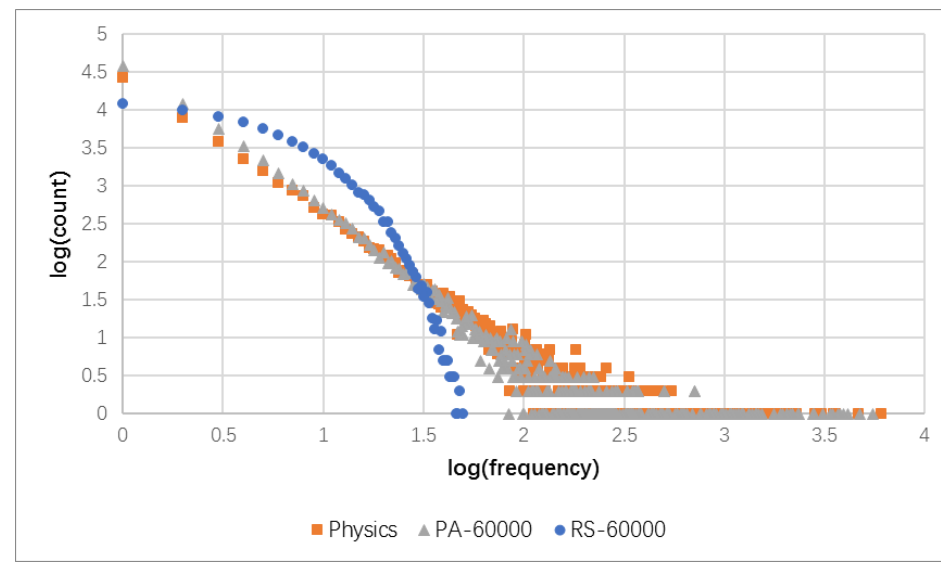
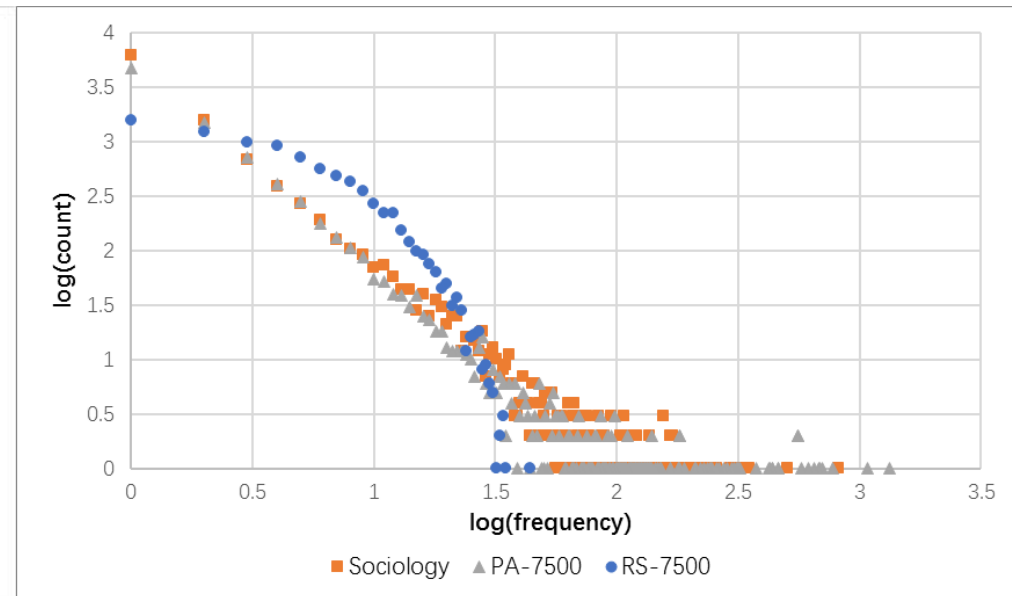
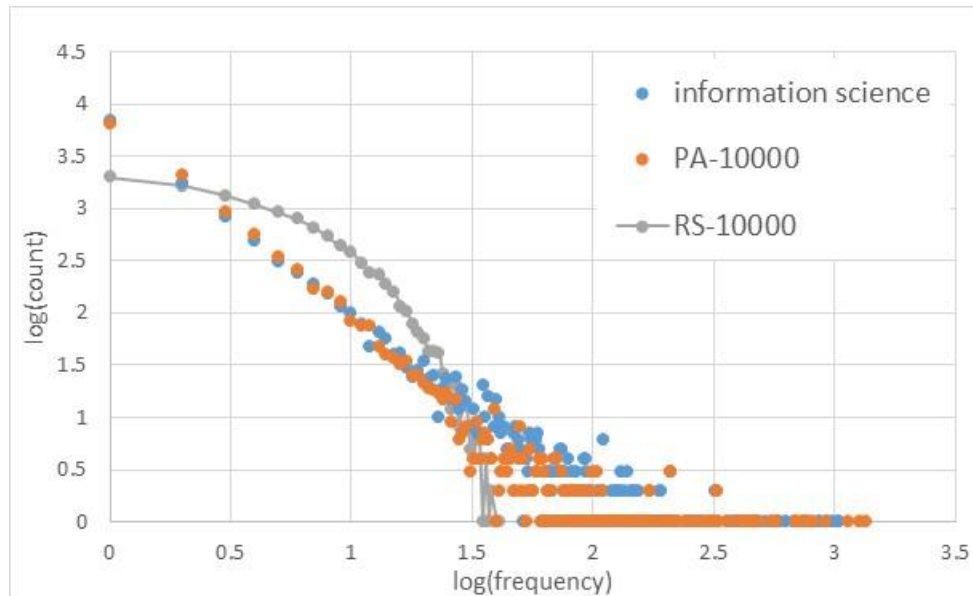
M times for a collection with M papers



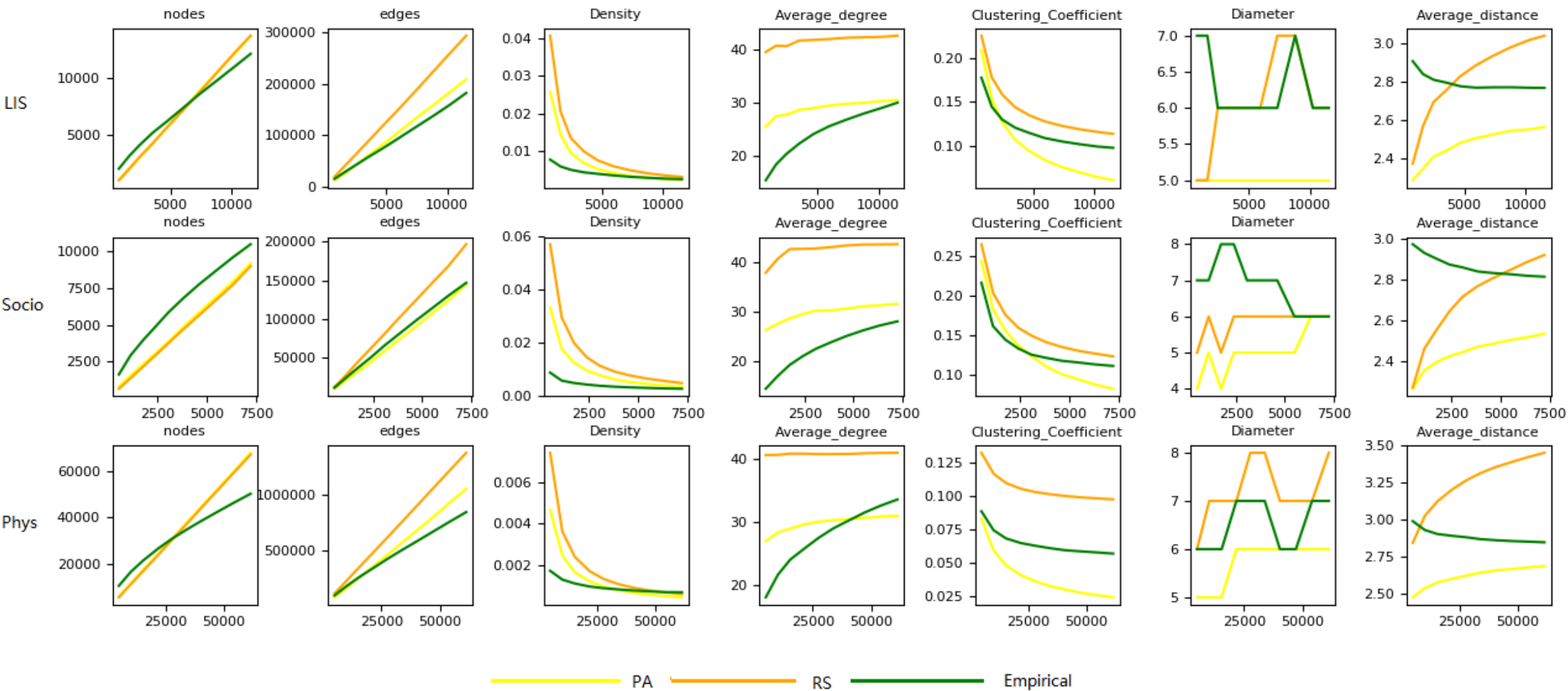
Research design

- Three empirical datasets
 - LIS, Sociology and Physics, Fluids & Plasma
 - Top 20 journals in WoS
 - Jan 2006 – Dec 2015
- Simulate co-word networks with comparable sizes as the empirical datasets.
- Compare simulated co-word networks with empirical networks.

Results – Keyword Frequency Distribution



Network comparison



Findings

- PA networks are more similar to empirical networks than RS networks
- RS creates many more edges than empirical data
- The rate of generating new keywords needs to be domain-dependent

Limitations & Future work

- Only a few factors are considered when simulating co-word networks
 - Damping factor controls creation of new keywords
 - PA, RS for keyword selection
- The simulation does not consider the maturity of a field, or other field dependent factors
- Current study only consider KeywordPlus field. Author keywords, title words could also be studied.

Thank you!

