The JASIST Editorial Board Members' Research Areas and Keywords of JASIST Research Articles*

JASIST 편집위원회의 연구분야와 JASIST 논문의 키워드에 관한 연구

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ABSTRACT

This paper examines the characteristics of the JASIST (Journal of the Association for Information Science and Technology) editorial board members and their research areas through author co-citation analysis, and investigates whether the editorial board members' research areas are related with keywords frequently appeared in the journal's research articles. In the process, research areas of the central members and those appeared most frequently as keywords will be identified. Research areas of the 36 members on the JASIST editorial board are collected and categorized to compare with the categorization of keywords extracted from 169 research articles published in JASIST, 2013. The result shows that members with higher centrality in the co-citation network are related with research areas that are also dominant in the distribution of article keywords. The areas include information behavior and searching, information retrieval, information system design, and bibliometrics.

초 록

본 논문은 JASIST(Journal of the Association for Information Science and Technology)의 편집위원회 구성원들의 연구분야와 JASIST에 수록된 연구논문의 키워드에 연관성이 있는지에 대한 연구로서, 저자동시인용분석을 이용하여 JASIST 편집위원회 구성원들의 특성을 파악하였고 네트워크분석을 통해 저자동시인용네트워크에서 중심성이 높은 구성원들의 연구분야를 조사하여 2013년 한 해 동안 JASIST에 수록된 연구논문의 키워드와 비교하였다. 이를 통해 JASIST 편집위원회 구성원들 중 저자동시인용네트워크에서 중심성이 높은 구성원들은 주로 정보행태, 정보검색, 정보시스템과 계량정보학에 관련된 연구를 하는 것으로 나타났으며 이는 JASIST에 수록된 연구논문의 키워드에도 가장 많이 나타나는 분야인 것으로 조사되었다.

Keywords: JASIST, editorial board, author co-citation analysis, network analysis, article keywords
편집위원회, 저자동시인용분석, 네트워크분석, 논문키워드

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1. Introduction

Of all the fields of science, library and information science may be one of the most multi-disciplinary fields covering wide variety of subdisciplines. Bates (2012) described the information disciplines as one of the "meta-disciplines", which "deal with every traditional subject matter, but do so from a particular perspective" (p. 2). The traditional academic disciplines include arts, humanities, social and behavioral sciences, and natural sciences and math, and meta-disciplines such as the information discipline, communication / journalism, and education cover theoretical and practical aspects of those traditional disciplines. Starting from its roots as library science, which deals with traditional works at libraries, and adjusting to the new digital environment and changing the name as library and information science, the field has been expanded to deal with various aspects of information from its creation to dissemination. In regard to its multi-disciplinarity, the intellectual structure of library and information science has been analyzed by many scholars (Tuomaala, Järvelin, & Vakkari, 2014; Milojević et al., 2011; Zhao & Strotmann, 2008; Åström, 2007; Moya-Anegón, Herrero-Solana, & Jimenez-Contreras, 2006) and the analyses of the field's knowledge structure have been accumulated to the extent where one can obtain the intellectual structure of the library and information science at various points in time. Still, the study of the intellectual structure of a discipline has to be continued because it shows the research trends and developments in the given field.

In an attempt to examine the recent research trends and development in library and information science, this study investigates whether a journal's editorial board members' research areas of interest has any association with the subject areas of the journal's articles to discover the research specialties that are studied more than others. Among the leading journals of the field, JASIST (*Journal of the Association for Information Science and Technology*) was chosen for analysis, and author co-citation analysis employing network analysis will be used to explore the main research areas of the editorial board members. Keywords of research articles published in JASIST will be extracted manually by scanning through all research articles published in 2013.

2. Review of the Related Literature

2.1 JASIST as a Subject of Analysis

JASIST (*Journal of the Association for Information Science and Technology*) is one of the leading journals in the field of library and information science. Currently, its impact factor is 2.230 in *Journal Citation Reports*, which makes it included in top 10 journals in the "information science & library science" subject category. Since its birth as *American Documentation* in 1950, as *Journal of the American Society for Information Science* from 1970, as *Journal of the American Society for Information Science and Technology* from 2001, and as *Journal of the*

Association for Information Science and Technology from 2014, the journal has been one of the most influential venues for authors to publish their original research articles. Due to its authority and the amount of articles published per year, it is often used as a subject for bibliometric analysis. Researchers extract bibliographic information such as author, title and keywords of articles from the journal and use them as data for their bibliometric analyses. They can analyze patterns of coauthorship, co-citation, bibliographic coupling, or subjects of articles and compare the results with other sets of bibliographic data or other period of time.

He and Spink (2002) compared foreign authorship distribution in JASIST and the *Journal of Documentation* and indicated that the most frequent foreign authors of JASIST were from UK and Canada. According to the study, compared to *Journal of Documentation*, JASIST was less receptive to foreign authors although the percentage of foreign authors in JASIST appeared to be increasing. The study was done in 2002 and covered JASIST and *Journal of Documentation* from 1950 to 1999, thus the result may need to be updated. Sin (2011) analyzed papers published in six LIS journals including JASIST to investigate international coauthorship and citation impact, and Chua and Yang (2008) studied the collaboration trends between authors of articles published in JASIST to investigate the existence of the shift towards multi-disciplinarity in information science. Sin's 2011 study discovered collaboration among national and international scholars in all of the six journals during the studied time period, 1980-2008, and Chua and Yang (2008) confirmed that collaboration among authors was prevalent, top authors' departments were diversified, and top keywords were distributed to subdiscriplines of information science, such as information technology and socio-behavioral science. Tsay (2011, 2008) compared three information science journals regarding each journal's characteristics and found out that JASIST published more than twice of articles of the other two journals, *Information Processing and Management* and *Journal of Documentation*, and the analysis of highly cited journals and books indicated that JASIST is information science oriented with some degree of diffusion into other disciplines. The study listed searching, online information retrieval, information work, subject heading, information storage and retrieval, technical services, world wide web, computerized information storage and retrieval, citation analysis, and bibliometrics as the top 10 subjects of LIS journal papers cited in JASIST, 1998-2008. Analysis of highly cited books indicated information retrieval was the major subject for the articles in JASIST, since Salton & McGill's *Introduction to Modern Information Retrieval*, Van Rijsbergen's *Information Retrieval*, and Salton's *The SMART Retrieval System: Experiments in Automatic Document Processing* were the top 3 highly cited books by JASIST articles.

Seo (2010) analyzed information science research in JASIST between 1985 and 2009. The study identified information retrieval, informetrics, information use and users, network and technology, and publishing and services as the most productive areas of

research, and especially information retrieval has been steadily studied by many information scientists. Informetrics is one of the popular areas of research for recent studies, and researches on information use and users are also steadily conducted. Kim and Song (2014) studied research trends in domestic and international information science articles by co-word analysis, and their results concurred with Seo's analysis that information retrieval is the predominant area of research and informetrics is the one receiving attention more recently. Especially, web-related informetrics started to be prevalent due to the advancement of internet.

2.2 Editorial Board

A journal's editorial board ensures "the quality and relevance of the research eventually published" (Garcia-Carpintero, Granadino, & Plaza, 2010) by selecting referees who can distinguish articles that are in the right direction that the journal is headed and filter out articles that are not adequate to be published. Therefore, inclusion in such a group means the individual is an expert in the research area and qualified to evaluate others' researches. Therefore, a journal's editorial board consists of a group of distinguished professionals with expertise in subjects related to the journal. In other words, analysis of a journal's editorial board members' subject areas may result in a meaningful findings. García-Carpintero, Gradadino, and Plaza (2010) analyzed the nationalities of the top 20 journals' editorial board members and found out that 53% of the members were from the United States, 32% from Europe, and 9.8% from the United Kingdom. The study investigated whether the board members' nationalities correlated with the scientific output of their corresponding countries, and the result showed that "a correlation was found between the main geographical regions from which board members came and the scientific output of those regions" (p. 805). Particularly, South Korea was one of the emerging countries that appeared to have a significance presence in editorial boards as well as a growing number of articles in journals included in *Journal Citation Reports*. Mauleón et al. (2013) analyzed gender balance among journal authors and editorial board members, using 131 Spanish journals in all fields of science, and discovered the presence of females in authorship and editorial board membership. Editorship of female members were lower than those of males but the gap seemed to be diminishing over the years. Cabanac (2012) investigated characteristics of the JASIST and 76 other Information Systems journals using demographic data about 2,846 individuals who served as members of the editorial boards. The study showed that the average number of the editorial board size is 43.6, while there were 32 members in the JASIST editorial board. As of August 2014, JASIST has 36 editorial board members. Cabanac's study (2012) revealed that the editorial board members of JASIST were given more articles to review than most of the other journals, with the ratio of 5.9 published articles per year, while they published less articles than other journal's editorial board members with a median of 14 journal articles for all journals included

in the study. In terms of geographic diversity calculated by dividing the number of distinct countries by the number of editorial board members, JASIST was shown to have a 0.28 geographic diversity, slightly lower than the median ratio of 0.32. Other findings of the study include that editorial boards of journals with high 5-year journal impact factor tend to have lower geographic diversity and more female members than other journals. Baccini and Barabesi (2011) also analyzed editorial board members of "information science and library science" journals using network analysis, resulting in identifying two main subfields, LIS and MIS. In addition, the study categorized journals in the central and peripheral positions in the network.

3. Data Collection and Analysis

The data for this study consists of three elements: (1) the author co-citation data for the 36 members on the JASIST editorial board, (2) the author's research area data, and (3) the keywords for JASIST articles published in 2013. First, the co-citation data for the 36 members on the editorial board of JASIST was collected by searching for an author's indexed name as a cited author in Cited Reference Search of *Web of Science* Core Collection, for the recent 5 years of *Social Science Citation Index*. The search results were saved as a set for each author, then a pair of sets were combined to obtain the number of references that cite the pair of authors. For unique names such as Kevyn Collins-Thompson, who is indexed as "Collins-Thompson, K", there is a very slim chance of errors for the number of citing references, but common names like Hsinchun Chen, who is indexed as "Chen, HC", leave a greater margin of errors when searched for citing references because there are many "Chen, HC"s in all fields of science. However, combining the result for "Chen, HC" AND "Bar-Ilan, J" return 8 references in the information science and library science field, although the result for "Chen, HC" was 1,719 references and the result for "Bar-Ilan, J" was 422 references. The raw co-citation counts were used to construct a valued non-directional symmetric 36 X 36 matrix, and UCInet (Borgatti, Everett, & Freeman, 2002) was used to analyze the basic statistics about the data and draw the networked map of the members. Appendix 1 shows the raw-count co-citation matrix.

The authors' research areas were collected by searching for each author's affiliated organization's website or the author's own websites. Although the list of the editorial board members only shows their names, most names were easily searched and the results were mainly university websites' faculty page with lists of their research areas. If there were multiple scholars with the same name, additional searches were performed to confirm that the individual was a member of the JASIST editorial board. Confirmation of whether the individual was a member of the JASIST editorial board and their research area data came from their own websites or their curriculum vitae. Most of the members listed three or four research areas, except Richard B. Hill, who is an executive director of ASIS&T and does not have a personal

or professional web page. The only clue for his research area is that he has a master's degree in comparative literature, but it was not included in the analysis because the topic is not related to library and information science. Table 1 shows a list of terms appeared more than twice, 15 out of 129 unique terms representing their research areas.

〈Table 1〉 Editorial Members' Research Areas - Top 15 Terms

Research Area Terms	Frequency
Information Retrieval	10
Information Behavior	7
Bibliometrics	4
Digital Libraries	4
Scientometrics	4
Human-Computer Interaction	3
Information Policy	3
Knowledge Management	3
Scholarly Communication	3
Computer Supported Cooperative Work	2
Controlled Vocabularies	2
Information Seeking	2
Internet Research	2
Natural Language Processing	2
Research Evaluation	2

The editorial members' research areas were coded using research specialties categories of ELIS (*Encyclopedia of Library and Information Sciences*, third edition). ELIS divides research areas of library and information sciences into two groups, cross-disciplinary specialties and research specialties. Cross-disciplinary specialties include (1) information arts, (2) linguistics and the information sciences, (3) philosophy and the information sciences, and (4) sociology of the information disciplines. Research specialties are classified into 9 categories; (1) bibliometrics, scientometrics, (2) information behavior and searching, (3) information organization and description, (4) information retrieval, (5) information system design, (6) legal and ethical issues, (7) social life of the cultural record, (8) social relations in information technology, and (9) social studies of information. For example, citation analysis and webometrics are included in (1) bibliometrics, scientometrics category, information use for decision making is included in (2) information behavior and searching, indexing and taxonomy are included in (3) information organization and description, and automatic abstracting and relevance judgments and measurements are included in (4) information retrieval. Examples of related topics listed under each research specialties category is displayed in Table 2.

The Encyclopedia admitted there were some missing topics such as digital libraries, economics of information, scientific and scholarly communication, information security, website design and management, and knowledge organization systems (Bates & Maack, 2009, p. xiv). If a research area cannot be located in the ELIS entry, Seo's information science taxonomy (2010, p. 137-138) was consulted. For example, knowledge management and digital libraries were coded under (5) information system design, because they were included in "system design & evaluation" category in Seo's taxonomy. Table 3 shows the coding result for the editorial board members and their research areas.

〈Table 2〉 Research Specialties of Library and Information Science in ELIS

Research Specialties	Related Topics
1. Bibliometrics, Scientometrics	Citation Analysis Citer Motivations Information Scattering, see also Informetric Laws Webometrics, see also Informetrics
2. Information behavior and searching	Information searching and search modules Information use for decision making Knowledge sharing mechanisms Learning and information seeking Online catalog subject searching, see also OPAC Personal information management Reading and reading acquisition Reading disorders Wayfinding and signage
3. Information organization and description	Indexing: history and theory Latent semantic indexing Metadata and digital information Moving image indexing Ontologies and their definition Semantic interoperability Still image indexing Taxonomy Topic maps
4. Information retrieval	Artificial neural networks and natural language processing Automatic abstracting and summarization Automatic discourse generation Boolean algebras Image retrieval, see Still image search and retrieval Information retrieval theory, see also Information retrieval systems Knowledge discovery in data streams, see also web retrieval and mining Modeling documents in their context Multilingual information access Music information retrieval Natural language processing for information retrieval Relevance in theory Relevance judgments and measurements Search engine optimization Still image search and retrieval User-oriented and cognitive models of information retrieval Web retrieval and mining Web social mining XML information retrieval

Research Specialties	Related Topics
5. Information system design	Children and information technology Design science in the information sciences Human-computer interaction research in information retrieval Information visualization User-centered revolution: 1995-2008
6. Legal and ethical issues	Art looking and trafficking Copyright and fair use in higher education Copyright and trademark law in the United States Cyberspace law Ethical and legal aspects of archival services Ethical aspects of library and information science Ethical issues in information systems Piracy in digital media Plagiarism of print and electronic resources Records compliance and risk management Theft, vandalism and security in libraries and archives Theft, vandalism, and security in museums
7. Social life in the cultural record	Censorship and content regulation of the internet Cultural memory Domain analysis in information science Museums and community Museums as place Open access scholarship and publishing Organizational memory Politics of representation in museums Social influence on classification Sociology of reading
8. Social relations in information technology	Collaborative information retrieval Computer-Mediated Communication (CMC) Computer-Supported Cooperative Work (CSCW)
9. Social studies of information	Cyberspace and the geography of information Diffusion of innovations, see Information technology adoption Digital divide Economics of information, see productivity impacts of libraries and information Information policy: European Union Information policy: United States Information technology adoption Information technology project implementation in developing countries Open source software Organizational culture Organizational learning Productivity impacts of libraries and information services Social informatics Social justice in library and information science Social networks and information transfer

〈Table 3〉 Editorial Board Members' Research Areas and their Coding Results

Name	Research Areas	Coded As
Theresa Dirndorfer Anderson	Creative writing, information studies, knowledge management, media and communication studies, new media, sociology	5
Judit Bar-Ilan	Information behavior, information retrieval, informetrics, internet research	1, 2, 4
Christine L. Borgman	Bibliometrics, digital libraries, human-computer interaction, information policy, information retrieval, information seeking, infrastructure, learning and cyberlearning	1, 2, 4, 5, 9
Lutz Bornmann	Peer review and bibliometric indicators, research evaluation	1
Kevin Boyack	Science mapping, scientometrics	1, 5
Donald Case	Information behavior, information policy, the social and educational effects of information technologies	2, 8, 9
Hsinchun Chen	Cybersecurity, data mining, text mining, and web mining, digital library and search engines	4, 5, 6
Kevyn Collins-Thompson	Information retrieval, human-computer interaction, machine learning	2, 4, 5
Miles Efron	Information retrieval, information filtering, social media, statistical learning	4, 5
Ayse Goker	Information retrieval	4
Richard B. Hill	None available	
Birger Hjørland	Document typology, domain analysis, knowledge organization	3, 4
Peter Ingwersen	Evaluation methodologies, information behavior, information retrieval	1, 2, 4
Jim Jansen	Internet research, web searching	2
Michael J. Kurtz	Astronomy, bibliometrics	1
Ray Larson	Digital libraries, evaluation of user interaction, information retrieval	4, 5
Vincent Larivière	Scholarly communication	7
Hang Li	Data mining, information retrieval, natural language processing, statistical machine learning	4
Elizabeth D. Liddy	Natural language processing	4
Christopher Lueg	Computer-Supported Cooperative Work, human computer interaction, information research, information systems, knowledge management, ubiquitous computing	5, 8
Jens-Erik Mai	Controlled vocabularies, information ethics, information organization, information theories	3, 6
Gary Marchionini	Digital libraries, human computer interaction, information architecture, information interaction, information policy, information retrieval	4, 5, 9
Katherine W. McCain	Bibliometrics, controlled vocabularies, diffusion and adoption of innovation, evaluation of information retrieval systems, image representation and retrieval, scholarly communication	1, 4, 7, 9
Claire McInerney	Community informatics, gender and technology, knowledge and information flow in organizations, knowledge management, websites as communication and information tools	5, 9
Javed Mostafa	Cyberinfrastructure for research and learning, multimedia information retrieval, personalization and user modeling	2, 4
Douglas Oard	eDiscovery, cross-language information retrieval, speech retrieval	4
Philip R.O. Payne	Conceptual knowledge engineering, biomedical informatics, clinical and translational science, clinical information system	5

Name	Research Areas	Coded As
Soo Young Rieh	Information behavior, human information interaction	2
Ronald Rousseau	Research evaluation, scientific communication, scientometrics	1, 7
Alan Rubel	Information ethics and policy, legal information, intellectual property	6
Ian Ruthven	Information retrieval, digital libraries, information behavior, information seeking, interactive information retrieval, research methods	2, 4, 5
Steve Sawyer	Distributed scientific collaboration, information sharing, social informatics	2, 7, 9
Diane Sonnenwald	Information behavior, collaboration technology, health information	2, 7
Michael Twidale	Information behavior, collaborative information retrieval, computer-supported cooperative work, user interface design and evaluation	2, 4, 5, 8
Jevin West	Bibliometrics, big data, citation network, scholarly communication, networks	1, 7
Paul Wouters	Citation analysis, scientometrics	1

Lastly, the keywords for 2013 JASIST articles were collected manually by scanning through author-provided keywords of the articles. There are 169 research articles published in 2013 with 208 unique keywords used. The total number of keywords including duplicates is 399. Table 4 is a list of top 25 keywords, and sum of their frequencies make up 42.36% of the entire keywords.

〈Table 4〉 Top 25 Keywords for Articles

Article Keywords	Frequency
bibliometrics	18
information retrieval	15
citation analysis	13
information seeking	10
text mining	10
natural language processing	8
automatic classification	7
content analysis	6
evaluation	6
information science	6
knowledge management	6
scientometrics	6
collaboration	5
human computer interaction	5
information use	5
knowledge representation	5
metadata	5
network analysis	5
information processing	4
knowledge	4
knowledge modeling	4
scholarly communication	4
semantic analysis	4
semantic web	4
social networking	4

Article keywords were also coded using the same research specialties categories from ELIS, from (1) bibliometrics, scientometrics category to (9) social studies of information. Two categories were added, (0) for unclassified and (10) for research methods and theories. Keywords related to regions (Asia, Europe) and ambiguous concepts (creativity) were classified as (0) unclassified, and keywords for research methods (content analysis, network analysis, multivariate analysis) and academic disciplines (information science, computer science, social sciences, philosophy) were classified as (10) research methods and theories. The following Table 5 shows examples and frequencies of each category.

〈Table 5〉 Categories for Article Keywords and their Examples with Frequencies

Categories	Examples	Frequency (%)
0. Unclassified	Asia, Europe, creativity, advertising	9 (2.26%)
1. Bibliometrics, Scientometrics	Bibliometrics, citation analysis, citation networks, co-citation analysis, impact factor, indicators (values), informetrics, scientometrics, webometrics	61 (15.29%)
2. Information behavior and searching	Information seeking, information use, end user searching, browsing, human behavior, information behavior, searching, user studies	72 (18.05%)
3. Information organization and description	Aboutness, citation indexes, contextual information, knowledge representation, metadata, ontologies	32 (8.02%)
4. Information retrieval	Digital libraries, human computer interaction, information processing, knowledge management, machine learning	71 (17.79%)
5. Information system design	Artificial intelligence, computer simulation, customization, data formats, data reduction, database design, database management, email, full text database, hierarchical models, image enhancement, information technology, message systems, multimedia	71 (17.79%)
6. Legal and ethical issues	Banned materials, copyright, personal information	3 (0.75%)
7. Social life of the cultural record	Archival science, museum informatics, scholarly communication, open access publications	21 (5.26%)
8. Social relations in information technology	Computer-mediated communication, international aspects	2 (0.50%)
9. Social studies of information	Communities of practice, communication skills, innovation, online communities, virtual communities	20 (5.01%)
10. Research methods and theories	Content analysis, computer science, information science, multivariate analysis, qualitative research, social sciences, statistical methods	37 (9.27%)

Among 399 article keywords, (2) Information behavior and searching (18.05%), (4) information retrieval (17.79%), and (5) information system design (17.79%) are the top 3 most frequently occurred keyword categories, followed by (1) bibliometrics, scientometrics (15.29%).

4. Result

4.1 The editorial board members' co-citation network and their research areas

The author co-citation matrix was used to create a networked map of the JASIST editorial board mem-

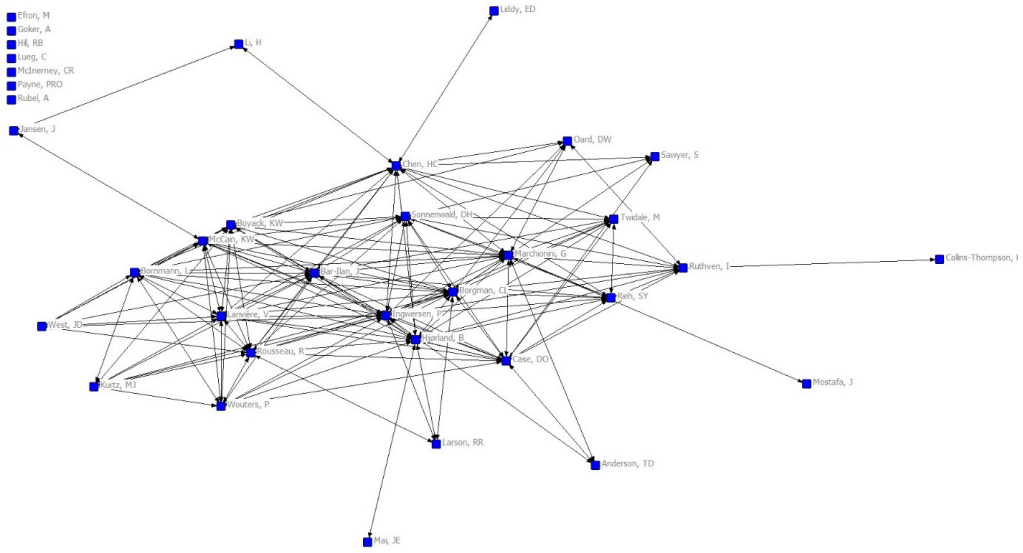
bers, and their research areas were used as an attribute data and turned into another matrix to create a separate network of the members' research areas. First, a table containing the board members' names as rows and their research areas as columns was constructed, then using UCInet's "Affiliations (2-mode to 1-mode)" menu, a new matrix containing the board members' names as both rows and columns were created and their research areas became the values of the matrix. If a pair of members share a research area in common, the value of the cell denotes the number of common research areas. For example, Bar-Ilan was coded as 1, 2, and 4, and Borgman was coded as 1, 2, 4, 5, and 9, then the cell for the pair contains 3 as the value. Figure 1 shows the process of turning an attribute table into a separate 1-mode network. The value for a cell crossing the same individual (Bar-Ilan and Bar-Ilan) is the number of research areas listed for the member.

Figure 2 shows the co-citation network of the JASIST editorial board, adjusting to 292 ties with a threshold set as 3. Then the two networks are compared to see whether there is a correlation between them. The process is called a QAP analysis, which "calculates measures of nominal, ordinal, and interval association between the relations in two matrices, and uses quadratic assignment procedures to develop standard errors to test for the significance of association" (Hanneman & Riddle, 2005, p. 294). It is a useful method "when investigating the association between two (or more) network matrices" (Scott & Carrington, 2011, p. 463) and used by bibliometric

	A	B	C	D	E	F	G	H	I	J
1	ID	1	2	3	4	5	6	7	8	9
2	Anderson, TD	0	0	0	0	1	0	0	0	0
3	Bar-Ilan, J	1	1	0	1	0	0	0	0	0
4	Borgman, CL	1	1	0	1	1	0	0	0	1
5	Bornmann, L	1	0	0	0	0	0	0	0	0
6	Boyack, KW	1	0	0	0	1	0	0	0	0
7	Case, DO	0	1	0	0	0	0	0	1	1
8	Chen, HC	0	0	0	1	1	1	0	0	0
9	Collins-Thompson, K	0	1	0	1	1	0	0	0	0
10	Efron, M	0	0	0	1	1	0	0	0	0

	A	B	C	D	E	F	G	H	I	J
1	ID	Anders	Bar-Ilan	Borgm	Bornm	Boyac	Case,	Chen,	Collins	Efron, M
2	Anderson, TD	1	0	1	0	1	0	1	1	1
3	Bar-Ilan, J	0	3	3	1	1	1	1	2	1
4	Borgman, CL	1	3	5	1	2	2	2	3	2
5	Bornmann, L	0	1	1	1	1	0	0	0	0
6	Boyack, KW	1	1	2	1	2	0	1	1	1
7	Case, DO	0	1	2	0	0	3	0	1	0
8	Chen, HC	1	1	2	0	1	0	3	2	2
9	Collins-Thompson, K	1	2	3	0	1	1	2	3	2
10	Efron, M	1	1	2	0	1	0	2	2	2

〈Figure 1〉 Creating a separate matrix for the editorial board members' research areas



〈Figure 2〉 The Networked Map of the Editorial Board of JASIST

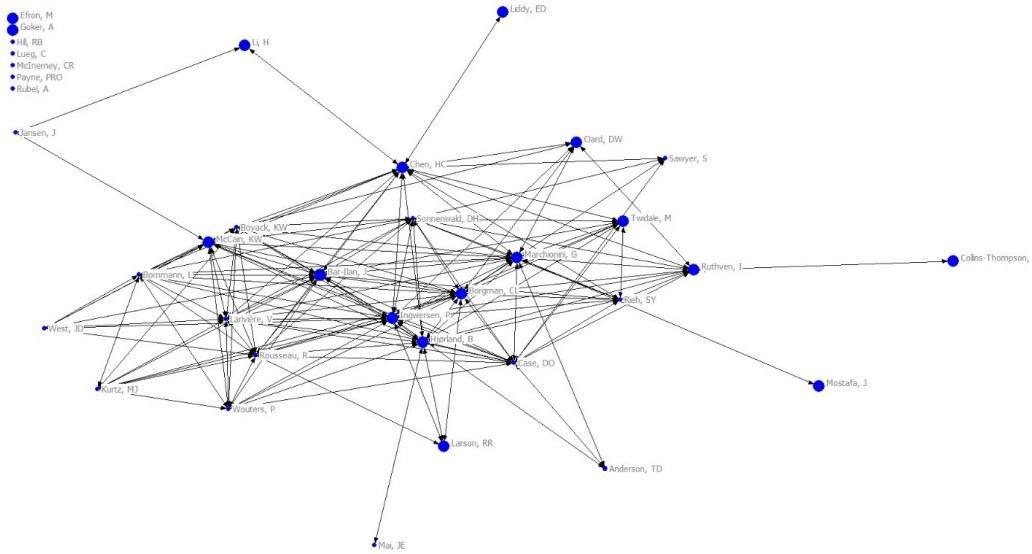
studies such as Qiu, Dong, & Yu (2014). The QAP analysis was used to test if the pattern of co-citation among members of the JASIST editorial board was correlated with the pattern of their research areas, and the result shows that a correlation of 0.215 exists at 0.01 level of significance ($p = 0.004$). Matrices showing which research areas are related to which editorial members will be discussed in the following section, 4.2.

4.2 The editorial board members and their centrality

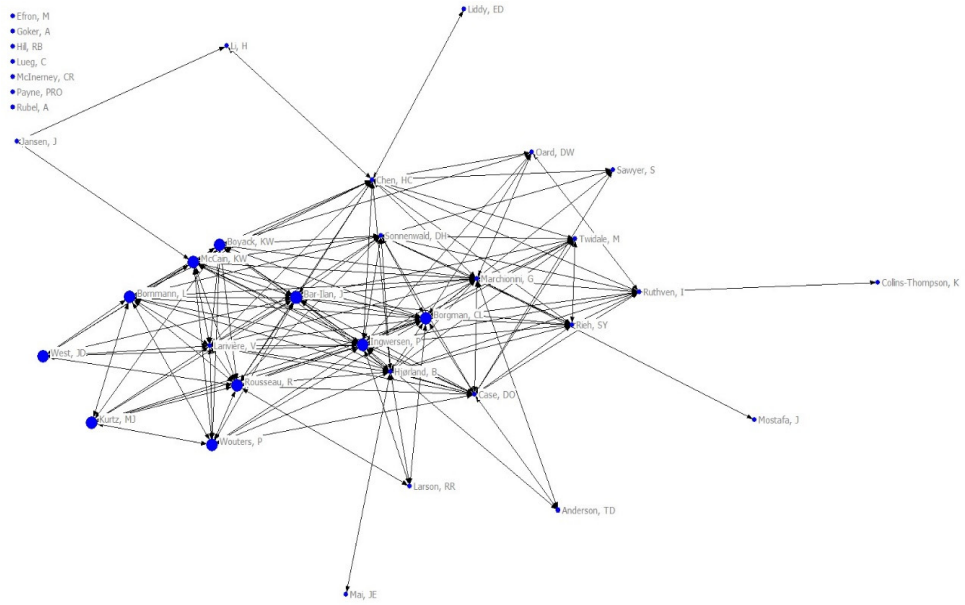
The centrality of a network, especially the centrality of an actor in a network, denotes that the actor is prominent in the relationship (Wasserman & Faust, 1994, p. 172). Whether the prominence is due to receiving or transmitting of many ties in the network, the central actor is said to be more involved in the relationship than any other actors in the network. For the co-citation network of authors, the central individual is the one who is cited with others more than anyone in the network. There are types of centrality; degree centrality, closeness centrality, betweenness centrality, and eigenvector centrality as the most frequently used centrality measures. Degree centrality for an actor or a node in a network is the simplest kind of centrality. It means the central actors "must be the most active in the sense that they have the most ties to other actors in the network or graph" (Wasserman & Faust, 1994, p. 178). Closeness centrality is based on distance, which measures "how close an actor is to all other actors in the set of actors" (ibid., p. 183). Betweenness centrality measures whether the actor is between many of the actors in the network. When interactions between actors

in a network rely on a specific actor, the actor can be considered as central in terms of betweenness centrality. Eigenvector centrality is "a weighted sum of not only direct connections but indirect connections of every length" (Bonacich, 2007, p. 555). Since the co-citation network is a network with valued strength, the study takes the degree centrality as the main measurement of the network's centrality, and the full list of the members and their centrality measures is available in Appendix 2.

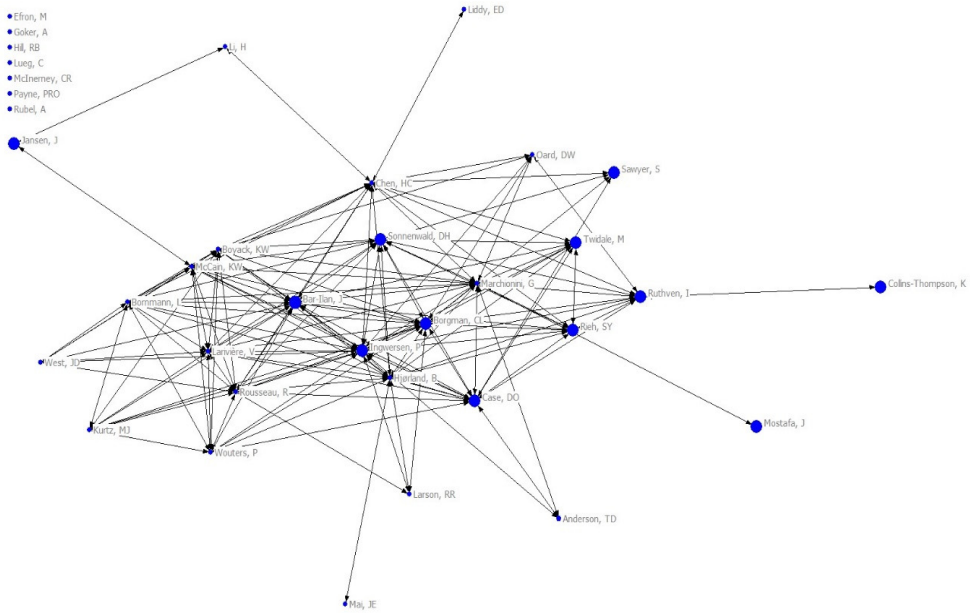
The notable feature regarding the editorial board members' centrality in the co-citation network and their research areas is that the central members are related with some of the research areas, in particular. Among the top 10 highly ranked members, 8 of them were related to information retrieval, and 5 for bibliometrics, information behavior and searching, and information system design, respectively. Figure 3 shows the editorial board members related to information retrieval in larger circles. Most of the central members, especially on the right side, are in the cluster. Figure 4 is for members related with bibliometrics, scientometrics, and they are in the left side of the network, sharing some members like Ingwersen, Borgman, Bar-Ilan, and McCain with the information retrieval group. Ingwersen is the most central member in the entire network. Figure 5 is for information behavior and searching, Figure 6 is for information system design, and both areas are related with members in the right side of the network. The figures show the editorial board members can be grouped into several clusters based on their research areas, especially for those four areas. Other areas of research do not distinctively appear in clusters.



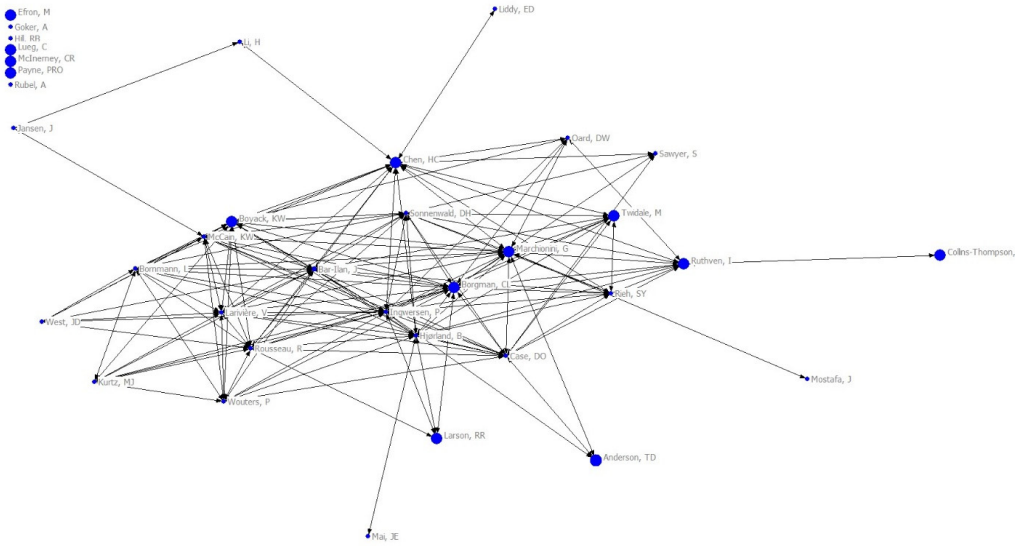
〈Figure 3〉 The Editorial Board Members related with Information Retrieval



〈Figure 4〉 The Editorial Board Members related with Bibliometrics, Scientometrics



〈Figure 5〉 The Editorial Board Members related with Information Behavior and Searching



〈Figure 6〉 The Editorial Board Members related with Information System Design

4.3 The Editorial Board Members' Research Areas and JASIST Article Keywords

The analysis shows that the research areas of the editorial board members who are central in the network match the most frequently occurred keywords in research articles published in JASIST, 2013. Although the rankings are slightly different, four categories of research specialties in ELIS are related with most of the central members and appear most frequently as article keywords. The four categories include (1) bibliometrics, scientometrics, (2) information behavior and searching, (4) information retrieval, and (5) information system design. Among the four categories, information retrieval is most related with the central members, while information behavior and searching occurred most frequently as article keywords but the difference between the category and others in the list is extremely minor.

5. Conclusion

The study attempted to examine the recent trends and developments in library and information science research by investigating the characteristics of the JASIST editorial board members based on their co-citation patterns and their research areas. Then the distribution of keywords in JASIST articles published in 2013 was examined to observe if there's any relationship between the JASIST editorial board members' research areas and the article keywords. The co-citation network of the JASIST editorial board members correlates with the pattern of their research areas, and some research areas are related to the

members with higher centrality in the co-citation network as well as appeared most frequently as keywords in articles. Information retrieval is the most studied area of research by the central members of the editorial board, while information behavior and searching is the research specialty with most frequently occurred keywords followed by information retrieval and information system design with one keyword short. Bibliometrics is another area of research that is studied by many of the central members of the editorial board, also occurred quite frequently as article keywords. The least occurred keywords are related with "legal and ethical issues" and "social relations in information technology", and these research specialties are not distinctively associated with the central members of the JASIST editorial board.

6. Limitations and Further Research

The study tried to investigate whether a journal's editorial board members research areas influence the subject areas of the articles published in the journal. JASIST was chosen for the analysis because it is one of the most leading journals in the field and claims to cover many areas of research in the field of library and information science – aims and scope of the journal indicates that publishes original research on "the production, discovery, recording, storage, representation, retrieval, presentation, manipulation, dissemination, use, and evaluation of information and on the tools and techniques associated with these processes" (Wiley Online Library, 2014). However, it is still very limited to restrict the analysis to one journal and one year period. More extensive analysis with more journals over some longer period of time may result in better understanding of the phenomenon if there is any relationship between the editorial board members' research areas and the subject areas of research articles that are published in the journal. In addition, a longitudinal analysis will provide a systematic view of what areas of research are studied more than others at each period of time. Also, author co-citation analysis can be enriched with full text as suggested by Boyack, Small, and Klavans (2013) or it needs other ways to calculate the co-citation strength (Jarneving, 2008).

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[Appendix 1] Co-Citation Matrix for the JASIST Editorial Board Members

	Andereso	Bar-Ilan, J	Borgman,	Bornmanr	Boyack, K'	Case, DO	Chen, HC	Collins-Th	Efron, M	Goker, A	Hill, RB	Hjørland, B	Ingwerse	Jansen, J	Kurtz, MJ	Larson, RF	Larivière,	Li, H	Liddy, ED	Lueg, C	Mai, JE	Marchioni	McCain, K	McInerne	Mostafa, .	Oard, DW	Payne, PR	Rieh, SY	Rousseau	Rubel, A	Ruthven,	Sawyer, S	Sonnenw	Twidale, M	West, JD	Wouters,
Anderson, TD																																				
Bar-Ilan, J	0																																			
Borgman, CL	1	25																																		
Bornmann, L	0	92	17																																	
Boyack, KW	0	19	18	73																																
Case, DO	8	8	11	15	3																															
Chen, HC	1	8	1	6	16	1																														
Collins-Thompson, K	0	0	1	0	0	0	3																													
Efron, M	0	1	0	0	0	1	3	1																												
Goker, A	0	3	1	0	1	1	0	0	0																											
Hill, RB	0	0	0	0	0	0	0	0	0	0																										
Hjørland, B	1	4	12	3	14	25	6	0	1	2	0																									
Ingwersen, P	7	41	15	13	11	35	11	1	3	3	0	49																								
Jansen, J	0	0	0	1	1	1	1	0	0	1	0	0	0																							
Kurtz, MJ	0	10	6	10	6	1	0	0	0	1	0	2	4	0																						
Larson, RR	0	3	6	1	2	1	2	0	1	0	0	6	11	0	0																					
Larivière, V	0	42	17	90	37	4	5	0	1	0	0	6	14	0	19	0																				
Li, H	0	1	0	2	2	0	19	2	0	0	0	1	1	25	0	0	1																			
Liddy, ED	0	0	1	0	0	2	4	0	0	0	0	2	2	0	0	1	0	0																		
Lueg, C	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0																	
Mai, JE	1	1	1	0	0	1	1	0	1	0	0	35	3	0	0	2	0	1	0	0																
Marchionini, G	6	9	30	5	6	31	23	1	2	3	0	15	56	1	1	3	4	1	2	0	2															
McCain, KW	0	28	38	26	60	6	5	0	1	2	0	16	17	4	3	3	30	1	0	0	2	4														
McInerney, CR	0	0	1	0	0	1	0	0	0	0	0	2	3	1	0	0	0	1	1	0	0	2	0													
Mostafa, J	1	1	1	0	1	0	3	0	0	1	0	1	1	0	0	0	0	1	0	0	0	7	0	0												
Oard, DW	0	1	7	0	4	1	4	1	0	1	0	2	6	0	0	0	0	1	0	0	0	10	0	0	1											
Payne, PRO	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0										
Rieh, SY	2	12	5	0	0	17	5	2	0	2	0	9	18	2	0	0	1	1	3	0	0	26	1	1	2	2	0									
Rousseau, R	0	83	22	244	71	6	18	0	1	1	0	9	47	0	14	7	83	3	0	0	0	3	50	1	0	0	0	0								
Rubel, A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
Ruthven, I	2	2	10	0	1	8	4	4	2	3	0	5	38	1	0	1	0	2	3	0	1	36	2	1	2	8	0	18	0	0						
Sawyer, S	0	3	4	0	2	6	6	0	0	0	0	1	2	1	2	0	3	3	0	1	2	1	2	1	0	1	0	0	1	0	1					
Sonnenwald, DH	0	7	17	9	5	24	1	0	0	1	0	10	20	0	1	0	9	1	0	0	0	9	9	3	0	1	0	12	19	0	11	4				
Twidale, M	1	8	4	0	0	10	4	0	0	0	0	8	12	0	0	1	3	1	2	0	1	11	1	0	0	0	0	11	0	0	3	1	10			
West, JD	0	11	2	43	16	1	1	0	0	0	0	0	5	0	3	0	16	0	0	0	0	0	5	0	0	0	0	0	48	0	0	0	1	0		
Wouters, P	0	17	18	42	17	5	3	0	2	0	0	6	8	1	5	0	16	1	2	0	0	1	10	0	0	0	1	1	23	0	0	0	3	1	1	

[Appendix 2] Full List of the JASIST Editorial Board Members and their Centrality Measures

	Degree	2-Local Eigen-vector	Bonacich Power	K-Step Reach	Average Recip. Dist.	Freeman Closeness	Eigen-vector	Between-ness	2-Step Between-ness
Ingwersen, P	31	599	5692.912	33	32	43	0.241	30.696	30.201
Marchionini, G	30	597	5652.509	33	31.5	44	0.239	17.696	17.576
Hjørland, B	29	579	5475.631	33	31	45	0.231	23.051	22.556
Case, DO	28	567	5372.55	33	30.5	46	0.227	13.872	13.792
Chen, HC	28	567	5348.107	33	30.5	46	0.226	14.985	14.865
Borgman, CL	28	562	5330.14	33	30.5	46	0.225	15.678	15.598
Bar-Ilan, J	26	556	5219.976	33	29.5	48	0.221	8.375	8.375
McCain, KW	25	541	5062.58	33	29	49	0.214	7.066	7.066
Ruthven, I	25	505	4744.776	33	29	49	0.201	11.278	11.198
Boyack, KW	24	504	4720.002	33	28.5	50	0.2	16.178	15.483
Sonnenwald, DH	23	514	4785.651	33	28	51	0.202	4.78	4.78
Li, H	23	466	4379.479	33	28	51	0.185	17.751	17.016
Wouters, P	22	466	4356.409	33	27.5	52	0.184	14.029	13.459
Rieh, SY	22	460	4296.691	33	27.5	52	0.182	7.777	7.697
Rousseau, R	21	464	4337.171	33	27	53	0.183	4.221	4.221
Sawyer, S	21	456	4244.526	33	27	53	0.179	10.555	10.305
Lariviere, V	20	461	4276.871	33	26.5	54	0.181	2.531	2.531
Twidale, M	19	435	4018.546	33	26	55	0.17	2.963	2.883
Bornmann, L	18	416	3857.531	33	25.5	56	0.163	2.044	2.044
Kurtz, MJ	16	375	3489.804	33	24.5	58	0.148	0.8	0.8
Larson, RR	16	373	3444.402	33	24.5	58	0.146	1.715	1.715
Goker, A	16	370	3417.818	33	24.5	58	0.145	2.008	2.008
Oard, DW	16	376	3431.926	33	24.5	58	0.145	1.75	1.75
Mai, JE	15	354	3243.341	33	24	59	0.137	1.294	1.254
Efron, M	14	325	2999.093	33	23.5	60	0.127	1.832	1.832
West, JD	13	310	2889.537	33	23	61	0.122	0.067	0.067
Mostafa, J	13	309	2809.963	33	23	61	0.119	0.893	0.813
McInerney, CR	13	306	2788.371	33	23	61	0.118	1.266	1.266
Jansen, J	13	295	2721.718	33	23	61	0.115	1.445	1.445
Liddy, ED	12	291	2640.71	33	22.5	62	0.112	0.609	0.609
Anderson, TD	11	268	2428.752	32	21.833	64	0.103	0.378	0.378
Collins-Thompson, K	9	217	1956.573	33	21	65	0.083	0.418	0.418
Lueg, C	3	81	719.839	32	17.833	72	0.03	0	0
Payne, PRO	3	69	628.814	31	17.667	73	0.027	0	0
Hill, RB	0	0	0	0	0	140	0	0	0
Rubel, A	0	0	0	0	0	140	0	0	0