

An Invisible Network of Knowledge of Security and Privacy of Health

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Abstract—This paper adopt scientometrics to analyse many articles's citation data and realize the paradigm shift of security and privacy of health. Privacy and security are two crucial issues in the protection of healthcare privacy. Privacy is a principle to assure that patients have more control over their health information and set limits on the use and disclosure of health information. The security is to guard data integrity, confidentiality, and availability.

By analyzing 10,218 citations of 349 articles published in SSCI and SCI journals in the security and privacy of health field from year 2003 to year 2012, this study maps the intellectual structure of security and privacy of health studies and find the development of security and privacy of health. After executing keyword analysis and tag cloud analysis, "technology", "records", "confidentiality", "internet", "communication" and "access-control" are the emerging topics in the security and privacy of health field. The contribution of this study is to provide important insights and implications of security and privacy of health. The timeline of development of security and privacy of health field reveal that protection of security and privacy of patient is very important.

Index Terms—Health care, intellectual structure, privacy, security.

I. INTRODUCTION

The Health Insurance Portability and Accountability Act (HIPAA) privacy and security regulations are two crucial provisions in the protection of healthcare privacy. Privacy regulations create a principle to assure that patients have more control over their health information and set limits on the use and disclosure of health information. The security regulations stipulate the provisions implemented to guard data integrity, confidentiality, and availability [1]. Patients, policymakers, providers, payers, employers, and others have increasing interest in using personal health records (PHRs) to improve healthcare costs, quality, and efficiency. Patients' greatest concern about nearly every type of electronic healthcare applications, including PHRs, is security and privacy [2].

II. THEORETICAL DEVELOPMENT

If I have seen further, it is by standing on the shoulders of giants (Sir Issac Newton, 1645-1736). It's said "stand on the shoulders of giants (the under-box slogan of Google Scholar®)" in which giants means the highly cited authors,

papers and books. We realized that via Invisible Network of Knowledge (INK) model [3] could help a novice to navigate the blue ocean of knowledge domain when the novice knows nothing.

The past decade has especially seen extensive research on security and privacy of health. There is an area or field of security and privacy of health, the question remains somehow unclear on how it work, and what are its prospects and needs for future development.

The aim of this study is to provide security and privacy of health researchers with a unique map to better understand security and privacy of health related publications and to provide a systematic and objective mapping of different themes and concepts in the development of Security and privacy of health field. This study also attempts to help identify the linkage among different publications and confirm their status and positions in their contribution to the development of health care field.

Every discipline could be seen as a particular knowledge system that is a component of a more general knowledge system. Within each discipline, journal articles, books, and monographs fill the fundamental role of storing and distributing information. Of these three means of formal communication, journal articles are perhaps the most competitive and controversial.

Consequently, citations that appear in articles published in the journals of a particular discipline provide an objective measure of the contributions of other knowledge systems to the development and progress of that particular discipline. Citations also give a relative measure of the particular contributions of authors, articles, and journals, to the progress of a particular field of knowledge. This analysis reveals a wealth of information, for example the lists of highly-cited authors, books, and articles presented here.

III. METHOD

Search "security", "privacy" and "health" related journals in SSCI journals fields. Select all the papers in every 5-year peroid(2003-2007, 2008-2012) in the field, and analyze 10,218 citations of 349 articles published in SSCI journals in the security and privacy of health field from year 2003 to year 2012, this study maps the intellectual structure of security and privacy of health studies. Scientometrics can be a powerful research methodology for the understanding the epistemology of a field as it has evolved (and continue to evolve) by providing a historical timeline to follow up. Bibliometrics, timeline and tag cloud are applied to the study.

The tag cloud carries on the preliminary inquisition, pondered from the social network angle, uses the populace

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wisdom, a little at a time mounts up, or may innovate the theory and the real diagnosis, provides a new thinking direction. The tag cloud is the common display mode for the search results in folksonomy-based websites, presenting tag sizes according to the frequency and the popularity of the key words.

IV. THE FINDINGS

After Analyzing 10,218 citations of 349 articles published in SSCI and SCI journals in the security and privacy of health field from year 2003 to year 2012, highly cited authors and papers, timeline and tag cloud are found. The detailed data includes 3,169 citations of 115 articles from year 2003 to year 2007, and 7,049 citations of 234 articles from year 2008 to year 2012. Some articles were highly cited and arranged in Table I, show the historical timeline of security and privacy of health. 5-star ranking reveals the importance of the article. Some authors are in the mainstream of security and privacy of health studies.

TABLE I: HISTORICAL TIMELINE OF SECURITY AND PRIVACY OF HEALTH DEVELOPMENT FROM CITATION ANALYSIS (BIBLIOMETRICS). ANALYZING 10,218 CITATIONS OF 349 ARTICLES PUBLISHED IN SSCI AND SCI JOURNALS IN THE SECURITY AND PRIVACY OF HEALTH FIELD FROM YEAR 2008 TO YEAR 2012. FIVE-STAR RANKING REVEALS THE IMPORTANCE OF THE ARTICLE.

5-star	Year	Frequency Times cited	B/J	Author			
★★	2002	9	J	sweeney l	int j uncertain fuzz	v10	p557
★★	2002	7	J	kim mi	j am med inform assn proceedings 2003	v9	p171
★★	2003	7	B	cherukuri s.	international conference on parallel processing workshops		
★★	2004	8	J	blobel b	int j med inform	v73	p251
★★★★★	2006	18	J	tang pc	j am med inform assn	v13	p121
★★★★	2006	11	J	poon ccy	ieee commun mag	v44	p73
★★	2006	7	J	chaudhry b	ann intern med	v14	p742
★★	2007	7	J	ralston jd	j am med inform assn	v14	p798
★★★★	2008	10	J	kaelber dc	j am med inform assn	v15	p729
★★	2008	8	J	lee wb	ieee t inf technol b	v12	p34
★★	2009	7	J	kahn js	health affair	v28	p369

Table II, Fig. 1 and Fig. 2 show keyword analysis and tag cloud analysis, “technology”, “records”, “confidentiality”, “internet”, “communication” and “access-control” are the emerging topics in the security and privacy of health field.

TABLE II: KEYWORD ANALYSIS AND TAG CLOUD ANALYSIS, “TECHNOLOGY”, “RECORDS”, “CONFIDENTIALITY”, “INTERNET”, “COMMUNICATION” AND “ACCESS-CONTROL” ARE THE EMERGING TOPICS IN THE SECURITY AND PRIVACY OF HEALTH FIELD.

year2003-2007	Times cited	year2008-2012	Times cited	increased importance
Name	Frequency	Name	Frequency	
security	14	privacy	28	
privacy	12	security	27	
systems	10	care	26	
information	10	technology	17	important
care	9	health	16	
health	8	systems	15	
quality	7	information	13	
confidentiality	5	records	11	important
technology	5	confidentiality	11	important
internet	4	system	9	
access	4	internet	9	important
information-systems	3	communication	9	important
services	3	health-care	8	
general-practice	3	management	8	
management	3	access-control	8	important
health information	3	design	8	
public-health	3	impact	7	
medical-records	3	quality	7	
model	3	medical-records	6	



Fig. 1. Tag cloud analysis on keywords of the article from 2003 to 2007

over their health information. The security regulations stipulate the provisions implemented to guard data integrity, confidentiality, and availability. The cryptographic mechanisms are well defined to provide suitable solutions [1].

In 2009, Kahn focuses on characteristics of the ideal personal health record. Privacy issues are complex in part because newPHRs are not necessarily covered by the HIPAA regulations. An important policy implication is the protection of online health information and developing the tools for secure data exchange [10].

Tag cloud analysis was used to trace the development path of security and privacy of health research.

After executing keyword analysis and tag cloud analysis of 10,218 citations of 349 articles published in SSCI and SCI journals in the security and privacy of health field from year 2003 to year 2012, "technology", "records", "confidentiality", "internet", "communication" and "access-control" are the emerging topics in the security and privacy of health field. In the future, the main stream study of security and privacy of health may focus on "confidentiality", "internet", "communication" and "access-control".

Patients' greatest concern about nearly every type of electronic healthcare applications, including PHRs, is security and privacy. The contribution of this study is to provide important insights and implications of security and privacy of health.

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