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Editorial

Patent Citations to Webology Journal on the USPTO Database

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Abstract

Patents are an important link of science and technology in any field. The role and influence of patents on scientific research has become increasingly important in recent years. The purpose of the present research was to analyze citations to the *Webology* journal in patents issued by the United States Patent and Trademark Office (USPTO). This study begins with an overview on the importance of patents citations to journals and compares the citation counts provided by the USPTO for *Webology*, as an open access journal in the field of Library and Information Science (LIS) and Computer Science. This study indicates to what extent the *Webology* journal is used and cited by inventors in the USPTO. We analyzed the distributions of patent citations to *Webology*. The results show that the total number of patent citations to *Webology* papers on the USPTO was 13. It seems that technical papers (technology-oriented papers) related to the World Wide Web and search engines published in *Webology* attracted more citations from patents.

Keywords

Patent analysis; Patent metrics; Journal citations; Citation analysis

Introduction

Patents are highly detailed documents which allow inventors to register their inventions at the national and international level for a specified length of time. Patents are very important and valuable in the process of knowledge production and knowledge commercialization. They can make products more competitive and desirable in national

and international markets and increase the value of products to consumers. Accessibility to patent information is an important element for research, innovation and development (Noruzi & Abdekhoda, 2014). Patents are important vehicles for R&D and technological development. They are also important mechanisms for appropriating returns from R&D.

In patents, similar to scientific papers, references are given. These references concern mainly earlier patents ('prior art') in order to prove novelty in view of the existing technological developments and, generally to a lesser extent, to non-patent items, particularly scientific publications, the scientific non-patent references (e.g., journal papers) (van Raan, 2016).

Patent citations, particularly the citations to scientific references, are considered as the most popular indicator to track the relation between science and technology. During the patent granting procedure, the examiners should review the prior art and list them in the front page of the patent document in order to ensure the innovative and usefulness of the invention. Compared with the references provided by the inventors/applicants, the examiners references are determinant for the patent granting. The patent examiners can add new references or remove the existent ones given by the inventors/applicants (Narin & Olivastro 1998; van Looy et al. 2006).

Francis Narin, is a pioneer, who has contributed significantly to the field of science and technology policy and has worked extensively on the methodology of 'citations'. Initially, he used the Science Citation Index (SCI) to identify the frontiers of various fields. He has developed methods involving citations from one patent to another and from a patent to publications and shown that the creation of new technology is strongly determined by the creation of new knowledge in the sciences. He also has developed a method based on citations and the technology cycle time (and patented it as a business method) to identify the leaders in an industrial sector, as he finds that certain patent indicators have a strong positive relationship with stock market evaluations (Ramani & De Looze, 2002).

Non-patent references (e.g., journal papers) represent explicit connections between scientific research and technological innovations and thus can describe the features of science–technology linkages. Journal papers cited in patent applications can be used as indices to analyze the relationships between academic research and technology, which are called science linkages. It can also be used to measure the strength of the relationship between science and technology, or science intensity (Fukuzawa & Ida, 2016; Meyer 2000; Tijssen et al. 2000).

The number of citations to a journal in patents indicates to what extent the journal is industry-technology oriented and centered on applications (Noruzi & Abdekhoda, 2014).

Therefore, it is an ideal place for specialists from industry and research, and is consistently focused on staying at the leading edge of the industry. This study purported to appraise the existence and the importance of citation linkages between the scientific journals cited in patents (i.e., authors of scientific papers) and the generators of patented inventions (i.e., inventors).

Obviously, the scientific non-patent references represent a bridge between science and technology although they do not necessarily indicate the direct scientific basis of the invention described in the patent (van Raan, 2016). Nevertheless, many studies (for an overview see for instance (Callaert et al., 2014) emphasize the importance of further research of the role of scientific non-patent references in relation to the patented technological invention.

In the current study, we focus on a particular phenomenon, patent citations to a journal, *Webology* as an example. The publication of *Webology* was first started in August 2004 as an open access journal. It is an international peer-reviewed journal in English devoted to the field of the World Wide Web and serves as a forum for discussion and experimentation. It serves as a forum for new research in information dissemination and communication processes in general, and in the context of the World Wide Web in particular. As the *Webology* journal continues to grow, it is important to remain aware of where we stand relative to our peers. During all stages *Webology*'s growth and maturation as an open access journal we have strived to become and remain a relevant force in the world of academic publications (Noruzi, 2016).

Materials and Methods

The United States Patent and Trademark Office (USPTO) (www.uspto.gov) is a federal agency of the U.S. Department of Commerce. The role of the USPTO is to grant patents for the protection of inventions and to register trademarks. It serves the interests of inventors and businesses with respect to their inventions and corporate products, and service identifications (USPTO, 2015).

The USPTO can be used for patent/paper citation analysis, which measures the citation impact of an individual patent/paper (also a journal) as a function of the number of citations it receives from subsequent inventors. In addition, any inventor or author may legitimately wish to determine whether his/her own patent/paper has been criticized or used by others patents on the USPTO. Inventors and authors are interested in knowing whether anyone has cited their patents/papers. The USPTO facilitates this type of feedback in the scholarly communication cycle. Regardless of the year that the patent was granted, the USPTO permits inventors to identify where that patent was cited. Inventors

and authors can locate recent patents that have cited the particular patent/paper. A further use of the USPTO is to identify technology-oriented journals.

An important feature of the USPTO is that inventors and researchers can use it to trace interconnections among patents referencing or citing patents on the same topic and to determine the frequency with which others reference or cite a specific patent.

To retrieve the USPTO patents citing a journal (e.g., *Webology*), we used the following search command (OREF/*Webology*) in the advanced search. The field of OREF (Other References) on the USPTO database contains other references cited as prior art, including journals, books, and conference proceedings.

Results

The number of citations to a journal in patents indicates to what extent a journal is technology-oriented (Noruzi & Abdekhoda, 2014). Table 1 shows the number of citations to the *Webology* journal in patents issued by the USPTO. Table 1 shows that *Webology* is cited 13 times in patents.

Table 1. Number of citations to *Webology* in patents

#	Patent No.	Title
1	9,641,577	Exchanging digital content
2	9,367,609	Method and apparatus for submitting, organizing, and searching for content
3	8,954,425	Snippet extraction and ranking
4	8,898,182	Methods and arrangements for providing effective interactive query suggestions without query logs
5	8,862,880	Two-stage anonymization of mobile network subscriber personal information
6	8,832,093	Dynamic place visibility in geo-social networking system
7	8,538,400	Exchanging digital content
8	8,458,115	Mining topic-related aspects from user generated content
9	8,452,790	Method and apparatus for distributing content
10	8,412,707	Method and apparatus for distributing content
11	8,219,555	Method and apparatus for distributing content
12	8,064,894	Exchanging digital content
13	7,613,690	Real time query trends with multi-document summarization

Table 1 indicates the presence of *Webology* in patents. Briefly, the table illustrates the linkage between a scientific journal and industrial innovation (technology) in the field of LIS. Table 2 shows in detail which papers are cited by patents issued by the USPTO.

Table 2. Papers cited by patents

#	Paper title	Author	Patent No.	Inventors	Patent Filed Year
1	A study of web search trends. *Webology*, 1(2), 2004.	Amanda Spink & Bernard J. Jansen	7,613,690	Chowdhury; Abdur R., Pass; Gregory S., Sidhu; Kush, Walker; Travis	2006
2	A study of web search trends. *Webology*, 1(2), 2004.	Amanda Spink & Bernard J. Jansen	8,064,894	Bill, David S.	2006
3	On ontology alignment experiments. *Webology*, 3(3), 2006.	Hassan Abolhassani, Babak Bagheri Hariri, & Seyed H. Haeri	8,219,555	Mianji; Marty	2009
4	On ontology alignment experiments. *Webology*, 3(3), 2006.	Hassan Abolhassani, Babak Bagheri Hariri, & Seyed H. Haeri	8,412,707	Mianji; Marty	2009
5	On ontology alignment experiments. *Webology*, 3(3), 2006.	Hassan Abolhassani, Babak Bagheri Hariri, & Seyed H. Haeri	8,452,790	Mianji; Marty	2009
6	Location-based search engines tasks and capabilities: A comparative study. *Webology*, 4(4), 2007.	Saeid Asadi, Xiaofang Zhou, Hamid R. Jamali, and Hossein Vakili Mofrad	8,458,115	Cai; Rui, Hao; Qiang, Wang; Changhu, Xiao; Rong, Zhang; Lei	2010
7	Location-based search engines tasks and capabilities: A comparative study. *Webology*, 4(4), 2007.	Saeid Asadi, Xiaofang Zhou, Hamid R. Jamali, & Hossein Vakili Mofrad	8,832,093	Redstone; Joshua, Gertzfield; Benjamin J., Sharon; Eyal M., Narayanan; Srinivasa P., Hui; Daniel Jeng-Ping	2010
8	A study of web search trends. *Webology*, 1(2), 2004.	Amanda Spink & Bernard J. Jansen	8,538,400	Bill, David S.	2011
9	Generating best features for web page classification. *Webology*, 5(1), 2008.	M. Indra Devi, R. Rajaram, & K. Selvakuberan	8,862,880	Combet; Jacques, LeMaitre; Yves-Marie, Kivi; Antero	2011
10	More effective web search using bigrams and trigrams. *Webology*, 3(4), 2006.	David Johnson, Vishv Malhotra, & Peter Vamplew	8,898,182	Bhatia; Sumit, Majumdar; Debapriyo, Visweswariah; Karthik	2011
11	Location-based search engines tasks and capabilities: A comparative study. *Webology*, 4(4), 2007.	Saeid Asadi, Xiaofang Zhou, Hamid R. Jamali, and Hossein Vakili Mofrad	8,954,425	Xiao; Rong, Hao; Qiang, Wang; Changhu, Cai; Rui, Zhang; Lei	2015
12	A study of web search trends. *Webology*, 1(2), Article 4, 2004.	Amanda Spink & Bernard J. Jansen	9,641,577	Bill; David S.	2015
13	On ontology alignment experiments. *Webology*, 3(3), 2006.	Hassan Abolhassani, Babak Bagheri Hariri, & Seyed H. Haeri	9,367,609	Mianji; Marty	2016

It seems that technical papers (technology-oriented papers) related to the World Wide Web and search engines published in *Webology* attracted more citations from patents. Table 3 presents authors for whom their papers are cited by patents.

Table 3. Authors highly cited by patents

Authors	No. of patent citations
Amanda Spink & Bernard J. Jansen	4
Hassan Abolhassani, Babak Bagheri Hariri, & Seyed H. Haeri	4
Saeid Asadi, Xiaofang Zhou, Hamid R. Jamali, & Hossein Vakili Mofrad	3
M. Indra Devi, R. Rajaram, & K. Selvakuberan	1
David Johnson, Vishv Malhotra, & Peter Vamplew	1

Discussion and Conclusion

We analyzed the frequency of patent citations to the *Webology* journal in the field of LIS and computer science. The results show that the total number of patent citations to *Webology* papers on the USPTO was 13. Scheerooren and Kamalski (2013) argue that "there is a distinct connection between citations in patents and the citation impact of a paper", which relates to the field in which it is published and the type of paper (research paper, technical paper, conceptual-theoretical paper, case study, viewpoint, literature review, general review, systematic review, ...). *Webology* papers cited in patents are generally technical (technology-oriented) and related to the World Wide Web and search engines. It is worth noting that the USPTO facilitates patent citation analysis (citations to a patent in other patents) and journal citation analysis (citations to a journal in patents). The current study can be used as a pattern for analyzing other journals.

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