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Fifty years of Information Sciences: A bibliometric overview

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ABSTRACT

Information Sciences is a leading international journal in computer science launched in 1968, so becoming fifty years old in 2018. In order to celebrate its anniversary, this study presents a bibliometric overview of the leading publication and citation trends occurring in the journal. The aim of the work is to identify the most relevant authors, institutions, countries, and analyze their evolution through time. The paper uses the Web of Science Core Collection in order to search for the bibliographic information. Our study also develops a graphical mapping of the bibliometric material by using the visualization of similarities (VOS) viewer. With this software, the work analyzes bibliographic coupling, citation and co-citation analysis, co-authorship, and co-occurrence of keywords. The results underline the significant growth of the journal through time and its international diversity having publications from countries all over the world.

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1. Introduction

Information Sciences is a leading international journal in computer science focused on research connected to information, intelligent systems and knowledge engineering. John M. Richardson was the founding Editor-in-Chief. The current editor-in-chief took this position at the end of 2003 when Paul P. Wang, from Duke University, stepped down. In 1968, Information Sciences published only one issue and during the first years, it became a quarterly journal. In 1975, the journal increased to eight issues and in 1978, to nine issues divided in three volumes. In the nineties, the journal grew again publishing twenty-four issues per year and in 2012, it increased to thirty-six issues. Since 2016, the journal is publishing forty-eight issues every year, which proves the strong impact it is having in the scientific community with thousands of paper submissions from all over the world. In the 2016 Journal Citation Reports of the Web of Science, currently owned by Clarivate Analytics, the journal has an impact factor of 4.832, being in the 7th position out of 146 journals in the Web of Science Core Collection category of Computer Science, Information Systems. The journal is usually close to the top in most of the rankings in its field according to a wide range of measures including the five-year impact factor, the article influence score and the CiteScore.

Motivated by the journal's 50th anniversary, this paper develops a bibliometric analysis of the leading trends occurring therein. The aim is to identify the most significant aspects of the journal in terms of most cited papers, authors, institutions,

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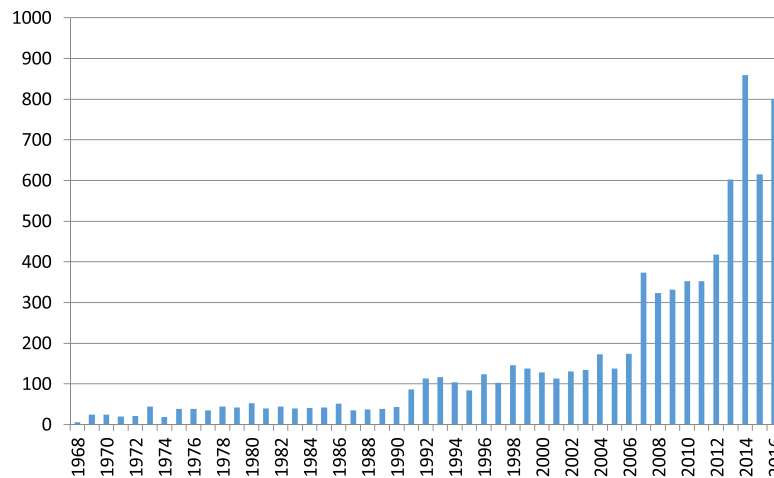


Fig. 1. Annual number of papers published in IS.

and countries. For doing so, the work analyzes all the documents published in the journal between 1968 and 2016 using the Web of Science Core Collection. The study also applies the Visualization of Similarities (VOS) viewer software [39] to map graphically the bibliographic material by employing a wide range of bibliometric methods including bibliographic coupling [22] and co-citation [35].

Observe that it is very common in the literature to develop some special activities when the journal celebrates a significant anniversary including editorials [2,34], reviews [40], and special issues [23]. Note that these anniversaries may also affect topics such as fuzzy set –based research [45], a significant field in the aims and scope of Information Sciences that celebrated the 50th anniversary in 2015. This event attracted a lot of attention with the publication of several special issues [12,20], representative papers [15,47] and some bibliometric overviews [28].

Many journals have presented a bibliometric analysis of the publications of the journal, especially through the celebration of their anniversary. For example, Heck and Bremser [19] study the first six decades of the *Accounting Review*. Schwert [33] presents a retrospective evaluation of the *Journal of Financial Economics* and Borokhovich et al. [6] of the *Financial Management Journal*. Ramos-Rodríguez and Ruíz-Navarro [32] characterize the *Strategic Management Journal* between 1980 and 2000, and García-Merino et al. [17] the first twenty-five years of *Technovation*. Biemans et al. [3] present an historical overview of the first twenty years of the *Journal of Product Innovation Management*, and Weiss and Qiu [41] of the first seventy-five years of the *Journal of Risk and Insurance*. Merigó et al. [29] develop a bibliometric analysis of the *Journal of Business Research* and Cobo et al. [10] of *Knowledge-Based Systems*. Recently, some other authors provide a bibliometric overview of other journals including the *International Journal of Intelligent Systems* [26], the *Journal of Business & Industrial Marketing* [37], *Computers & Industrial Engineering* [8] and the *European Journal of Operational Research* [24].

This paper is organized as follows. Section 2 reviews the bibliometric methods used in this paper. Section 3 presents the results including the publication and citation structure, and the leading authors, institutions and countries publishing in the journal. Section 4 develops a graphical analysis of the bibliographic data of Information Sciences with VOS viewer software. Section 5 summarizes the main findings and concludes the paper.

2. Bibliometric methods

Bibliometrics is a research area of information and library sciences that analyzes bibliographic data, such as year of publication, authors, country of origin, among others, by using a quantitative approach [7,31]. The development of a bibliometric analysis is very useful in order to classify and provide a representative overview of a set of bibliographic documents. In the literature, many bibliometric studies analyze a wide range of issues including topics, journals [36], institutions [11] and countries [5]. There are also several bibliometric overviews close to the aims and scope of the journal *Information Sciences* including fuzzy research [28], intuitionistic fuzzy sets [44], fuzzy decision making [4], linguistic decision making [43], aggregation operators [42], the ordered weighted average [16], computational intelligence [38], data mining [25] and ant colony optimization [13].

There are many different bibliometric indicators to represent the respective information, such as the number of papers and citations [14,18]. This study considers several of them in order to provide different perspectives so each reader can understand the results according to their specific interests and priorities. The reason for doing so is that today there is no consensus regarding a single optimal method that can correctly evaluate a set of documents. Depending on the problem, a method may be better than another one. From a general point of view, the two main perspectives to evaluate research are productivity and influence [30]. Productivity is usually measured with the number of publications, while the influence by the number of citations. However, there are other indicators for doing so and many exceptional situations may arise. Some

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