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25 years at Knowledge-Based Systems: A bibliometric analysis

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ABSTRACT

In commemoration of the Anniversary 25th of KnoSys we present a bibliometric analysis of the scientific content of the journal during the period 1991–2014. This analysis shows the conceptual evolution of the journal and some of its performance bibliometric indicators based on citations, as the evolution of its impact factor, its h-index, and its most cited authors/documents.

1. Introduction

Bibliometrics is an important tool for assessing and analyzing the academic research output. It contributes to the progress of science in many different ways [1]: allowing assessing progress made, identifying the most reliable sources of scientific publication, laying the academic foundation for the evaluation of new developments, identifying major scientific actors, developing bibliometric indixes to assess academic output, etc.

Bibliometrics provides objective criteria to assess the research developed by researchers, being increasingly valued as a tool for measuring scholarly quality and productivity [2]. It is an important approach to assess and analyze the research developed by different actors: countries, universities, research centers, research groups, journals and, in general, scientists [1,3].

In bibliometrics, there are two main methods for exploring a research field: performance analysis and science mapping [4,5]. While performance analysis aims to evaluate the citation impact of the scientific production of different scientific actors, science mapping aims to display the conceptual, social or intellectual structure of scientific research and its evolution and dynamical aspects.

The main aim of this paper is to carry out a thorough bibliometric analysis of the research conducted by the journal Knowledge-Based Systems (KnoSys) from 1991 to 2014. On the one hand, a performance bibliometric analysis on KnoSys is carried out by showing any data on some important performance indicators, such as, published documents, received citations, impact factor (IF) of journal [6], h-index of journal [7,8], most cited papers [9,3], most cited authors, and data on geographic distribution of publications. On the other hand, using SciMAT[1] [10], a science mapping analysis [11] based on co-word networks is performed in order to discover the most important research themes dealt in the journal and its conceptual evolution across the period of time 1991–2014. This science mapping analysis is based in the approach presented in [12], and it allows us to enrich the analysis with bibliometric performance indicators in order to highlight those themes that have received more attention by the research community.

This article is organized as follows: Section 2 introduces the dataset. In Section 3, the performance bibliometric analysis is carried out. In Section 4 the science mapping analysis of KnoSys is presented. Finally, some conclusions are drawn in Section 5.

2. Dataset

In order to carry out the performance and science mapping analysis, the research documents published by KnoSys must be col-

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[1] SciMAT (Science Mapping Analysis software Tool) – http://sci2s.ugr.es/scimat.

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0950-7051/

lected and also, preprocessed.

Since ISI Web of Science (ISIWoS) is the most important bibliometric database, the research documents published by KnoSys were downloaded from it using the following advance query: *SO=("KNOWLEDGE-BASED SYSTEMS")*.

This query retrieved a total of 1864 documents from 1991 to 2014. The corpus was further restricted to articles and reviews. Citations of these documents are also used in this study; they were counted up to 17th October, 2014.

The raw data was downloaded from ISIWoS as plain text and entered into SciMAT to build the knowledge base for the science mapping analysis. Thus, it contains the bibliographic information stored by ISIWoS for each research document. To improve the data quality, a de-duplicating process was applied (the authors keywords and the ISI keywords plus were used as unit of analysis). Words representing the same concepts were grouped. Furthermore, some meaningless keywords in this context, such as stop words or words with a very broad and general meaning, e.g. "ALGORITHMS", were removed. In addition, authors and affiliations were preprocessed.

Next, using the SciMAT period manager, two consecutive periods of times were established to show the conceptual evolution of the KnoSys in the science mapping analysis that will be done in Section 4. To avoid data smoothness, the best option would have been to choose one-year periods. However, it was found that not enough data were generated in the span of a single year to obtain good results from science mapping analysis. For this reason, the entire time period (1991–2014) was subdivided into periods of more than 1 year. Additionally, although it is common to use periods covering the same time span, the decision was taken to have the first period span eighteen years (1991–2008) because of the low numbers of researchers and publications in the early years. This achieved a first period of a reasonable size when compared with the subsequent period, which was necessary for a good science mapping analysis and to detect the main research themes. Therefore, the data are divided into two consecutive periods of time: 1991–2008, 2009–2014, with 2425 and 4112 keywords, respectively.

3. Performance bibliometric analysis of the KnoSys

In this section an analysis based on performance bibliometric indicators is carried out. As aforementioned, the following performance bibliometric indicators are used in our analysis: published documents, received citations, impact factor (IF) of journal [6], h-index of journal [7,8], most cited papers [1,3], most cited authors, and data on geographic distribution of publications.

3.1. Publications and citations

The distribution of publications by year is shown in Fig. 1. As we can observe, the number of publications of KnoSys by year has gone increasing. Until 2007 the number of publications is around 50 by year, i.e, the number is low. From 2008 until 2011, that number of publications is increased to twice, i.e, around 100 by year. And, in the last two years, it has almost tripled, i.e., around 300. Therefore, KnoSys is a journal which has attracted an increasing interest in the scientific community. This is corroborated by the steady growth of papers submitted to the journal in the last years: 1300 submissions were received in 2012, 1546 submissions for 2013, and for 2014 KnoSys has received 1665 submissions.

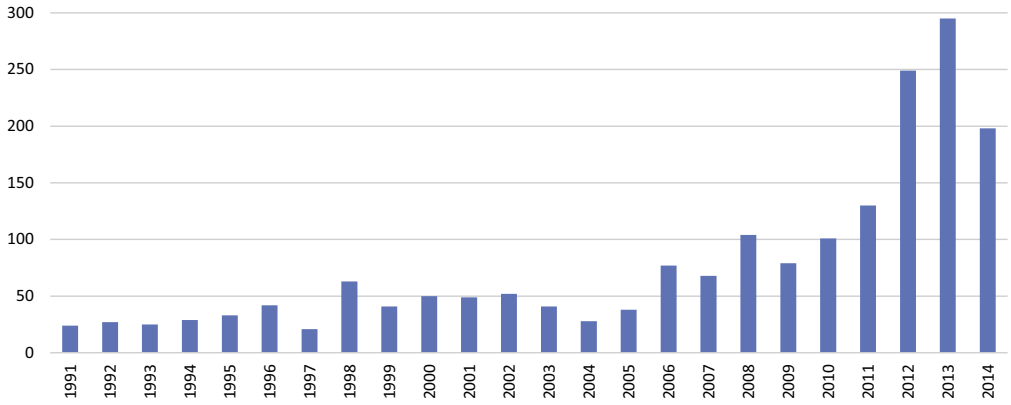

Fig. 1. Distribution of documents by year (1991–2014).

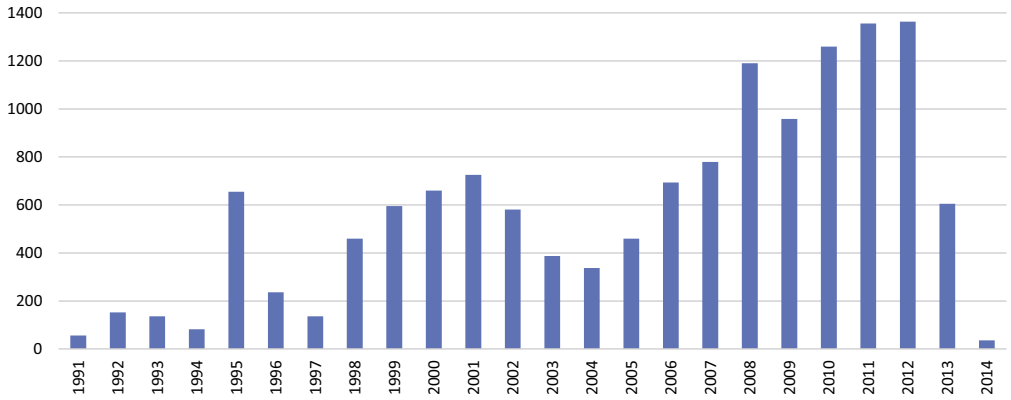

Fig. 2. Distribution of citations by year (1991–2014).