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SCIENTOMETRICS TOOLS AND TECHNIQUES: AN OVERVIEW

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Abstract

Journals play an important role in scholarly communication. Periodicals are sensitive indicators of the emerging new ideas in any discipline. They reveal the existing problems requiring solution, research pattern to solve these problem, the practices fixed to various areas etc. "A scientific paper or text not only reveals the world building strategy of its authors, but also the nature and force of the building blocks derived from the domain of science from which it draws and to which it contributes" [GUPTA & KUMAR, 2001].The application of statistics to any scientific communication channels is called scientometrics. Scientometrics is a branch of science. Scientometricians explain about input and outputs resource in terms of organizational structure. They develop benchmarks to evaluate the quality of information resources and packages of information for decision making in science. It provides a key opportunity to the researcher to publish their articles with new strategies, innovations, new methods and new ideas.

***Keywords**: scientometrics, Citation Mapping , For Visualization, bibliographic data, co-citation, scientific literature*

Scientometrics – Term Origin

The term 'Scientometrics' was originated from a Russian word (naukometriya) and coined by Vassily V.Nalimov and Z.M.Mulchenko in the year 1969. This term is mainly used for the study of all aspects of the literature of science and technology. The term had gained wide recognition in the year 1978 by the foundation of the journal 'Scientometrics' by Tiber Braun in Hungary. According to its subtitle, Scientometrics includes all quantitative aspects of the science of science, communication in science and science policy.

Scientometrics - Definitions

Nalimov and Mulchenko (1969) or USSR defined Scientometrics as the quantitative method which deals with the analysis of science viewed as an information process. Beck (1978) defined Scientometrics as a stidy of the quantitative evaluation and inter comparison of scientific activity, productivity and progress.

Bookstein (1995) defined Scientometrics as "the science of measuring science".

From the above definitions, it is clear that Scientometrics provides information about the structure of knowledge and the way it is communicated; measures the publication patterns of all forms of written communication; provides evaluative measures to indicate individual country's output; indicate the citation pattern of literature and studies the use of documents.

Applications of Scientometrics

Scientometrics as a technique has extensive applications in identifying the research trends in a subject, trends in an authorship and collaboration in research, core periodicals, obsolescence and dispersion of scientific literature useful in estimating the comprehensive of secondary periodicals, studying the author's productivity and impact of research, distribution of scientific publications by the research organization, citation studies and so on. Further, Scientometrics could be used in the identification of emerging research areas.

Timeline of Scientometrics

Early 19th century	Origins of bibliometric research in areas such as law & psychology	1926-1948	Lotka's Law, Zif's Law and Bradford's Law developed.
In 1955	Eugene Garfield first describes the Impact Factor	In 1961	Publication of the Science Citation Index
In 1978	Launch of first dedicated journal, Scientometrics	1960s-70s	Growth of databases make Widespread citation analysis a real possibility

Scientometrics Tools and Purposes

The scientometric tools are very much essential for accurate analysis of literature. In scientometrics the qualitative as well as quantitative analysis are carried out by using scientometrics tools like citation mapping, visualization, bibliographic coupling, co-authorship network, co-words mapping etc..

Authormap - For Citation Mapping and Visualization. Explores author relationships through co-citation patterns.

Bibcouple.exe - For Visualization of the bibliographic coupling among authors using WoS set

Bibexcel - For analyzing bibliographic data and used for co-citation , bibliographic coupling, mapping and clustering analysis

BibJourn.exe - For Visualization of the bibliographic coupling in terms of cited journals

Citespace - For Visualizing patterns and trends in scientific literature

CleanPoP - Tool is designed to clean results systematically.

Co-auth.exe	-	Visualization of the co authorship network
Fulltext .exe	-	Software for co-word mapping of full text
HistCite	-	To analyze and visualize the bibliography
IntColl.exe	-	For Visualization of international collaboration
ISI	-	For organizing a set downloaded from the Web of-Science into databases for relational database management
Patent Pictures	-	It's patently good news
Publish or Perish	–	Retrieves and analyzes academic citations from Google Scholar
Tl.exe	-	Co-word mapping of texts

Scientometric Techniques

Pouris has classified the scientometrics techniques as one-dimensional, two-dimensional and multi-dimensional statistical techniques. One dimensional techniques are based on occurrences or on direct counts such as number of publications, patents or particular data-elements such as addresses, citations, or keywords. This technique is also known as scalar techniques. For monitoring the state of science and technology system, the scalar indicators are used.

The two-dimensional techniques are based on co-occurrences of specific data-elements such as number of times the keywords, classification codes, citations and addresses. This technique is also known as relational technique.

Multi-dimensional statistical techniques are being used to denote scientific universes. Continuous and discontinuous are the two methods in multi-dimensional statistical techniques. Continuous methods represent the structural or relational features of the data in the forms of maps. Maps are strategic indicators of the relevant positions of the documents in the knowledge space. Discontinuous methods are used to scale down the level of observations in science and technology networks.

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