Scientometric analysis of "IEEE Transactions on Cloud Computing" : 2013-2016

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Abstract- Present analyses the 101 research papers published in the Journal "IEEE Transactions on Cloud Computing" during the period 2013-2016 has been carried out. The data was collected from the archives of the journal available in online form. This paper examines the articles for year wise growth of the articles published, authorship pattern, length of paper etc. Index Terms- Bibliometrics, authorship pattern and degree of collaboration

Keywords: Scientometrics, Bibliometrics, Cloud Computing, IEEE, Authorshop Pattern

INTRODUCTION

According to Sengupta, Bibliometrics defined as "Organization, classification and quantitative evaluation of publication patterns along with their authorships by mathematical and statistical calculus". According to Pritchard "The Application of mathematics and statistical methods to all media of communication; Methodology of the information transfer process and its purpose is analysis and control of the process. Bibliometrics is an important tool for quantitative analysis of the research output produced by researchers. The term Bibliometrics was first coined by Pritchard (1969). Earlier Coles & Eales (1917) used the term "Statistical Analysis" for similar kind of study. Hulme (1923) used the term "Statistical Bibliography" for mapping the literature in graphical way. Dr. S. R. Ranganathan (1969) used the term "Librametry" for the study related to library and its services, applying statistical approaches. Pritchard used the term Bibliometrics to describe "all 'studies which seek to quantify the process of written communication". Fairthorne (1969) defined it as "The quantitative treatment of the properties of recorded discourse and behavior pertaining to it". In other words Bibliometrics is the statistical analysis of bibliographic data, commonly focusing on citation analysis of research outputs and publications. The factual inferences can be used to identify top performing journals in subject areas, top researchers in subject areas, trends in authorship and collaboration in research publications by scientists, citation studies and soon. Bibliometric methods which are commonly used by researchers to measure different aspects of publication are content analysis and citation analysis.

Introducing the IEEE Transactions on Cloud Computing, The Cloud computing paradigm is rapidly progressing, as evidenced by its adoption for the creation and delivery of innovative applications in several domains including scientific, consumer, social networks, health care, enterprises, banking, government, and big data. Several trade magazines have been actively featuring industrial development in Cloud computing. The IEEE, as part of its "IEEE Cloud Computing Initiative," has identified the need for a respected journal for publishing research in Cloud computing. The IEEE on Cloud Computing is published quarterly. The Journal publishes articles on cloud computing and storage on cloud and some areas of cloud

computing. The journal published by IEEE Computer society of India, started in 2013 with two issues the impact factor of journal is 4.41. The present study deals the Scientometric analysis of 101 articles from IEEE Transactions on Cloud Computing for the period of 2013-2016.

REVIEW OF LITERATURE

Shijith Kumar and Nanjunda Swamy (2016) The purpose of the present study was to bibliometric analysis of contents of the Journal of All India Institute of Speech and Hearing published from 1970 to 2015 to determine the types and quantities of information contents published, authorship characteristics, research domains of the scientific articles and to investigate changes, if any, in the publication pattern of the journal over the years. The bibliographic data on all the published volumes were collected manually from the print issues of the journal and the data were analyzed using descriptive statistics. It is found that the domain of speech along with its closely allied field language is accountable for the major share of scientific articles in the journal whereas hearing-related articles are comparatively less represented. The study noticed a trend towards intra-institutional, two-author and threeauthor collaboration. The journal achieved significant progress over the years. However, steps need to be taken to make the journal online, increase global visibility and to attract scientific contributions from across the world.

Hazarika, Goswami and Das analyzed bibliometric trend of the Journal Indian Forester during the period 1991- 2000. Study revealed that multiple authorship papers were dominant in the Journal (64.55%) followed by single author (35.45%) and double author (31.03%). Average length of papers showed that 45.29% papers covers 4-6 pages followed by 7-9 pages (27.96%) which shows the ideal length of a research paper.

Krishnamoorthy G, Ramakrishnan J, Devi S(2009) analyzed the Bibiliometrics analysis of literature on diabetes during 1995-2004. The results indicated the Relative Growth Rate was found to be decreasing and doubling time increasing every year.

Santhi and Jeyachitra studied papers published in IEEE Transactions on Control systems Technology from 1998-2007. Study was carried out for each cited reference on following point – Number of authors, type of document, continent of origin of the document etc. The study revealed that one paper contribution constituted 85.4 percent of total output and the authors who have contributed 5-21 paper constitute 0.43% alone. The above study supports the fact that when the number of published paper increases, the number of contributed author decreases

Velmurugan Velmurugan (2013) study aims to explore the publication of papers in Annals of Library and Information Studies. The Scientometric analysis has been conducted with 203 contributions published in the journal for a period of selected six years i.e. 2007 – 2012. It was observed from the study that the highest number of contributions i.e., 43 (21.19%) were published in the year 2010. Most of the contributions are found by double authored i.e., 88 (43.35 %.). The degree of collaboration (i.e.131out of 203) was high in terms of authorship pattern was 0.64.

OBJECTIVES

The following objective of the present study:
- To determine the year wise distribution of articles.
- To study the authorship pattern.
- To study the length of journal articles.
- To study the most Proliferent authors

METHODOLOGY

Three volumes containing 12 issues and 101papers of IEEE Transactions on Cloud Computing published during the year 2013 - 2016 are considered for the study. The data collected has been studied by applying filters on basis of different criterion. Quantitative techniques have been adapted for the study. The journal is analyzed for number of issues and papers published, number of authors, year wise growth in papers for the period of study.

Year-wise distribution of Papers

Table-1 shows the year-wise distribution paper, a total of 101 research papers were published by the journal with 3 volumes and 12 issues during the period of study (3 years). Maximum no. of papers published in 2015 with 51(50.50 %) followed by 39 (38.61%) research papers in 2014, while lowest in the year 2013 with 118(10.89%). There is increasing trend in publication of articles from the year 2013 to 2016.

Table-1: Year-wise distribution of Papers

Year	Volume No.	No. of Articles	%
2013	1	11	10.89
2014	2	39	38.61
2015	3	51	50.50
	Total	**101**	100
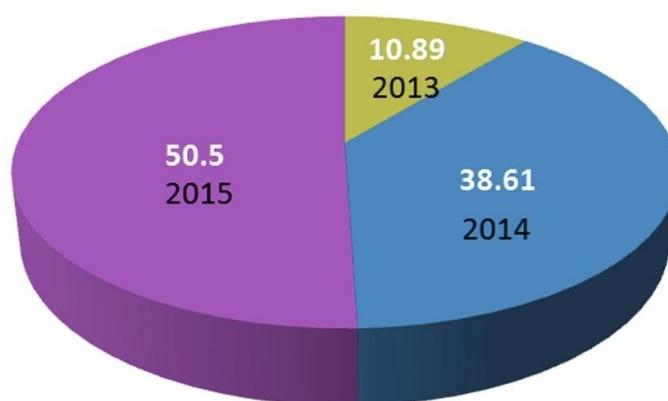
Fig.1 Year-wise distribution of Papers

Year-wise Authorship pattern

Table No. 2 reveals that out of 101 papers single authored contribution are 29(28.71%); four authors contributions are 28(27.72%); Three authors contributions are 27(26.73%); Two author contribution are 14(13.86%); while the remaining 3(2.97%) papers were contributed five author contributions. Collaborative research is important feature of research in every field and also in this journal. Below table-2 shows the authorship pattern of papers published during the period 2013 to 2016. Maximum number of papers i.e. 29 (28.71%) is contributed by single author.

Table-2: Authorship Patter

S.No.	Authors	No. of Articles	%
1	Single Author	29	28.71
2	Two Authors	14	13.86
3	Three Authors	27	26.73
4	Four Authors	28	27.72
5	Five Authors	3	2.97
	Total	**101**	**100**
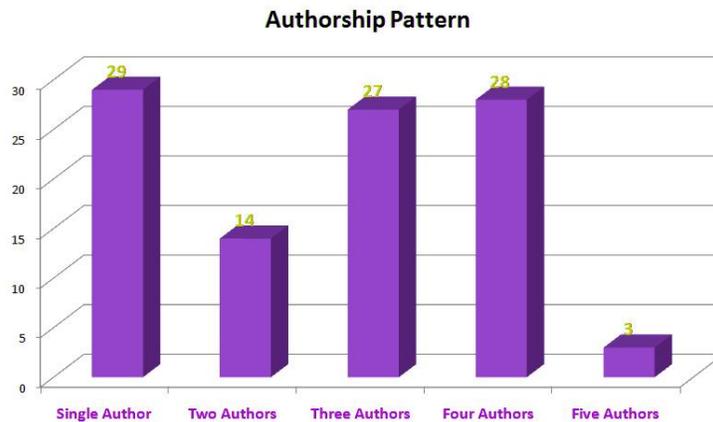
Fig.2

Year-wise Authorship Pattern

Table-3 indicates Year-wise authorship pattern of contribution by year. It shows that out of 29 contributions by single authors, in year 2014 has highest 15 papers. Where as the year 2013 has the lowest number i.e., 6 contributions. Out of 14 articles by two authors, year 2014 has highest 7 and 2013 has the lowest number i.e., 2 of publications. Out of 27 contributions by three authors, 2015 indicates highest number i.e.,16 and 2013 has non of contribution has made. Out of 28 contributions by four authors, year 2015 indicates highest number i.e.,20 and year 2013 has the lowest number i.e., 2 of contributions. It shows that out of 3 contributions by five and above authors, year 2015 has highest i.e., 2 whereas the year 2014 has the lowest number i.e., a single article contributions.

Table-3: Year-wise Authorship Pattern

Year	Single Author	Two Authors	Three Authors	Four Authors	Five Authors	Total	%
2013	6	2	0	2	0	10	9.9
2014	15	7	11	6	1	40	39.6
2015	8	5	16	20	2	51	50.5
Total	29	14	27	28	3	101	100

Most Proliferent Authors

Table-4 shows the most Proliferent authors in out of 101 contributions the most Proliferent author is 'R. Buyya' contributed 8 papers, followed by 'B.Sheng' with 6 papers; there were 10 authors contributed each of 5 papers; 4 papers by five authors and remaining three authors contributed each of three papers.

Table-4: Most Proliferent Authors

S.No.	Authors	No. of Articles	Ranking
1	R. Buyya	8	1
2	Y. Wang	6	2
3	B. Sheng	5	3
4	E. Masoumi	5	4
5	J. Tai	5	5
6	R. Ranjan	5	6
7	S. Di	5	7
8	S. Wu	5	8
9	X. Wang	5	9
10	H. Jin	5	10
11	R. N. Calheiros	5	11
12	X. Shi	5	12
13	Y. Yao	5	13
14	K. Li	4	14
15	M. F. Zhani	4	15
16	R. Boutaba	4	16
17	C. H. Hsu	4	17
18	N. Mi	4	18
19	J. Li	3	19
20	Q. Zhang	3	20
21	S. U. Khan	3	21
22	Two Article	54	23
23	Single Article	139	24

Length of Articles

Table -5 reveals that the majority of papers 33(32.67%) have the length 14 pages followed by 29(28.71%) with the length 13 pages; 11(10.89%) with 11pages; 9(8.91%) papers with the length of 15 pages; 6(5.94%) papers with the length of 10 pages; 3 (2.97%) papers with the length of 4 pages; remaining 1(0.99%) paper with the length of 3 pages, 16 pages and the highest length of the paper 19 pages. The majority of the papers 33(32.67%) has page length of 14 pages.

Table-5 Length of Articles

S.No.	No. of Pages	No. of Articles	%
1	3	1	0.99
2	4	3	2.97
3	10	6	5.94
4	11	11	10.89
5	12	7	6.93
6	13	29	28.71
7	14	33	32.67
8	15	9	8.91
9	16	1	0.99
10	19	1	0.99
	Total	**101**	100

CONCLUSION

An IEEE Transactions on Cloud Computing is the highly preferred journal in the field of engineering and technology. The scientometric study of cloud computing identified a total of 101 papers as a global output published for the period of 3 years. It is observed that the highest number of articles i.e., 51 (50.50%) have been appeared in the year 2015.The minimum number of contributions 11 (10.89%) was published in the year 2013. Out of 101 articles, the majority of the research articles written by single authors i.e., 29 (28.71%).

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