

Scientometric Analysis of Articles Published in “IEEE/ACM Transactions on Networking” During 2010-2014

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ABSTRACT: *This paper presents a scientometric study of Journal of IEEE/ACM Transactions on Networking. A total of 735 research articles and 2536 authors were examined by growth of contributions by year and volume, single and multi authored papers by year, degree of collaboration. Length of articles and observe the citations study etc. all the studies points towards the advantages and limitation of the journal which will be helpful for its further development.*

Keywords: Bibliometrics, Scientometrics, IEEE/ACM Transactions on Networking, Authorship Patterns, Degree of Collaboration, Citation Analysis

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1. Introduction

Bibliometric studies have been conducted on journals related mainly to scientific fields and are based principally on various metadata elements such as author, title, subject, citations and so forth. The Scientometric is a referred to a branch of science. It is one of the sub fields of Bibliometric. Nalimov and Mulchenko (1969) [1] defined this term “The Application of those quantitative methods which are dealing with the analysis of science viewed as an information process”. The study discussed in this journal article provides some of these analyses related to the authorship patterns and collaborative research in the *IEEE/ACM Transactions on Networking* published in the field of Engineering and Technology. It is one of the most extensive journal that appears in the world large database of IEEE Explore and will be the source of scientometric data.

2. History and Profile of IEEE/ACM Transactions on Networking

The Journal of IEEE/ACM Transactions on Networking is one of the foremost research journals in the communication and

networking field. It is Published Bimonthly online Electronic Journal. It is published cosponsored by the IEEE Communications society, IEEE computer society and the ACM (Association for computing Machinery). This journal covers the subject like network architecture and design, communication protocols, network software, network technologies, network services and applications and network operation management. The scope of journal includes all topics on communication and networking. The present study aims to explore the scientometric analysis of the research work on IEEE/ACM Transactions on networking selected five year published article period between 2010 - 2014.

3. Literature Review

A Number of studies have been carried out that may be useful supplementary analysis for the study presented here Karpagam et al (2011) [5] analyzed the growth pattern of Nanoscience and Nanotechnology literature in India during 1990 – 2009. Rajendran, Jeysankar, and Elango (2011) [6] determined 633 research articles published in Journal of Scientific and Industrial Research. They found that majority of papers were by multi-authors and Indian authors. Thavamani and Velmurugan (2013) [7] examined the pattern of authorship and degree of collaboration in the Annals of Library and Information Studies during 2002 – 2012.

4. Objectives of the Study

The primary objective of this study was to understand the growth of IEEE/ACM Transactions on Networking and contributor's research output in during the study period 2010 - 2014. The specific objectives are:

- To study the distribution of articles by year and volume,
- To study author productivity, single and multi authored papers by year
- To study of degree of collaborations
- To study the Length of Articles
- To study the year wise distribution of citations
- To observe the study of citations
- To study the forms of document cited by citations

5. Methodology and Data Collection

The data was collected from the IEEE/ACM Transactions on Networking website (<http://www.ieee.org> explore) covering the period from 2010 to 2014, seven hundred and thirty five articles and related information's about by year, number of authorship, single and multi authored by year, degree of collaboration were noted down for the study. The journal publishes original research articles in the field of Engineering and Technology, as well as related domains that encapsulate information and knowledge. All articles are source article published in the last five years (2010-2014) were recorded in a spread sheet and results were entered in Microsoft Excel. These data were organized, calculated, tabulated, analyzed and presented by using simple arithmetic and statistical methods in order to provide analysis.

6. Data Interpretations

The flowing seven tables and brief analyses represent the substance of this research.

Table 1 shows the number of contributions (i.e. research articles) and the number of Issues published by year. There have been 735 articles contributed by 2536 authors were identified in last five years. The highest number of research articles 150 (20.41%) were published in 2010. The smallest amount of research articles 141 (19.18%) were published in 2011.

Table 2 reveals the authorship pattern of the articles published during the study period. The contribution published by scientists is calculated to 735 over the study period. It has been proved from the analysis that single author papers have decaying trend and there by collective contributions have an increasing performance in scientific research activities.

Year	Issue-1	Issue-2	Issue-3	Issue-4	Issue-5	Issue-6	Total	Percent
2010	25	25	25	25	25	25	150	20.41
2011	23	24	24	23	24	23	141	19.18
2012	24	23	26	25	26	25	149	20.27
2013	25	24	25	24	24	25	147	20
2014	25	25	25	25	23	25	148	20.14
Total	122	121	125	122	122	123	735	100

Table 1. Distribution of Articles by Year and Issue

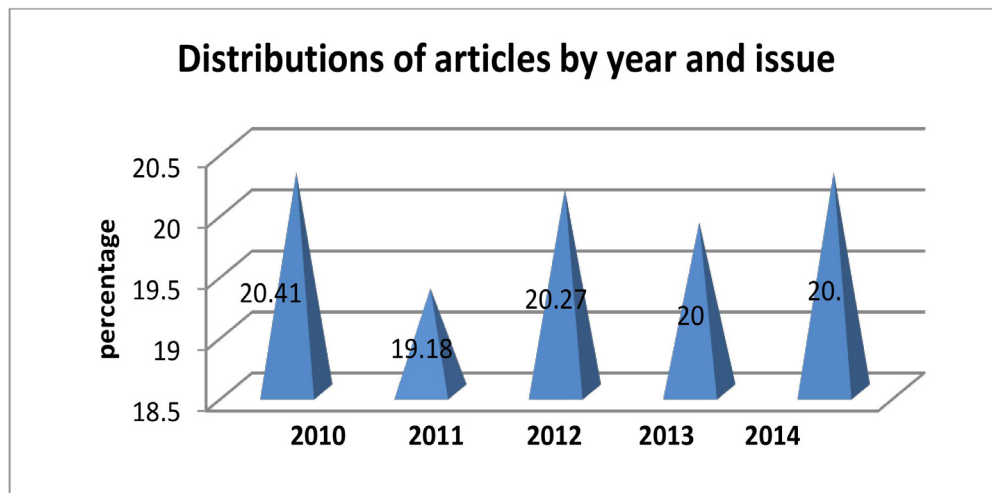


Figure 1. Distributions of articles by year and issue

Authorship Pattern							
Number of Authors	2010	2011	2012	2013	2014	Total	Percent
Single	6	2	–	1	2	11	1.5
Double	43	31	35	38	37	184	25.03
Three	47	59	49	36	37	228	31.02
Four	32	30	39	35	35	171	23.27
Five & above	22	19	26	37	37	141	19.18
Total	150	141	149	147	148	735	100

Table 2. Authorship pattern

Table 3 shows the degree of collaboration in the IEEE/ACM Transactions on Networking. To determine degree of author collaboration in quantitative terms, the formula given by K. Subramanyam (1982) was used.

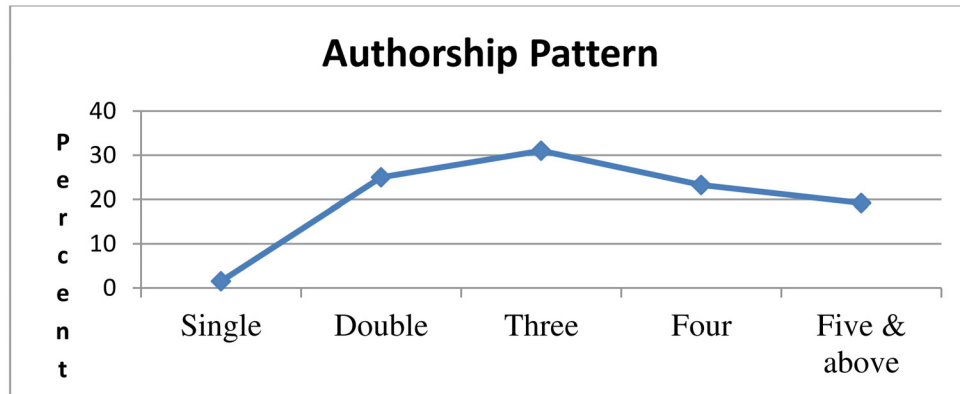


Figure 2. Authorship Pattern

The formula is where

C = Degree of collaboration

NM = Number of multi authored papers

NS = Number of single authored papers

$$C = \frac{NM}{NM + NS}$$

$$C = \frac{2525}{11 + 2525} = 0.99$$

In the present study the average value of C is $C = 0.99$

As a result, the degree of author collaboration in the IEEE/ACM Transactions on Networking is 0.99, which clearly indicates its dominance upon multiple author contributions.

Length of Articles						Total	Percent
Pages	2010	2011	2012	2013	2014		
1_10	5	14	9	4	4	36	4.9
11_15	145	126	134	137	138	680	92.50
16_20	—	1	6	6	6	19	2.58
Total	150	141	149	147	148	735	100

Table 4. Length of Articles

The length of articles is shown in table-4 where it is found that 680 (92.52%) articles has page length in the range 11_15 pages followed by 36 (4.9%) articles in the range of 1_10 pages. There are 19 (2.58%) papers having more than 16 -20 pages.

7. Citation Analysis

The references provided by the authors at the end of their articles are the basis of citation analysis. Citation traces a connection between two documents, one which cites and the other which is cited. It is popular methods applied to derive the scientific productivity.

Year wise Distribution of Citations by Year and issue								Percent
Year	Issue-1	Issue-2	Issue-3	Issue-4	Issue-5	Issue-6	Total	
2010	800	809	764	744	766	748	4631	19.7
2011	623	769	704	632	748	718	4194	17.84
2012	837	714	855	872	829	870	4977	21.18
2013	765	769	791	779	886	780	4770	20.3
2014	771	813	819	922	742	864	4931	20.98
Total	3796	3874	3933	3949	3971	3980	23503	100

Table 5. Year wise Distribution of Citations by Year and issue

Above table 5 shows that year wise appearance of references during the study period. For the period under study (2010-2014), in all 23503 citations were found appended to 735 papers. From table-5 it is clear that highest number of citations appeared in the year 2012 i.e., 4977 which is (21.18) percent of total number of citations contributed which is followed by 4194 (17.84) percent that lowest number of citations that appeared in the year 2011. It is also clear from table-6 that the average number of citations per paper is 31.98.

Study of Citations						Total	Percent
No of Citations	2010	2011	2012	2013	2014		
1_20	22	17	8	14	14	75	10.2
21_30	65	66	51	55	53	290	39.46
31_40	40	42	64	50	48	244	33.2
41_above	23	16	26	28	33	126	17.14
	150	141	149	147	148	735	100

Table 6. Study of Citations

Table-6 presents data on the range and percentage of references per paper. It is clear from table -6 that all the 735 papers published during the period 2010-2014 having references. the papers having references ranging from 21_30 form the largest group, that is 290 (39.46 percent) and papers having references ranging from 1_20 form the lowest group that is 75 (10.2 percent).

The table-7 above showed that majority of the contributors preferred seminar/conference proceedings as the source of information which occupied the top position with the highest number of citations 10609 (45.14%) of the total 23503 citations followed by journal with 8115 (34.53%) citations. it is found that the researchers preferred seminar/conference articles more frequently for the research work, than any other type of communications channels.

8. Findings

- 1) The Maximum number of articles published during study period in 2010 and minimum in 2011.
- 2) The highest number of articles was contributed by double authors and single authors contributed only minimum number of articles.

Forms of document cited		
Forms of Document	Total Number of Citations	Percent
Books	1509	6.42
Journals	8115	34.53
Seminar/conference proceedings	10609	45.14
E.Resources	1897	8.07
Reports	285	1.21
Thesis	133	0.57
Standards	71	0.3
Others	884	3.76
Total	23503	100

Table 7. Forms of document cited

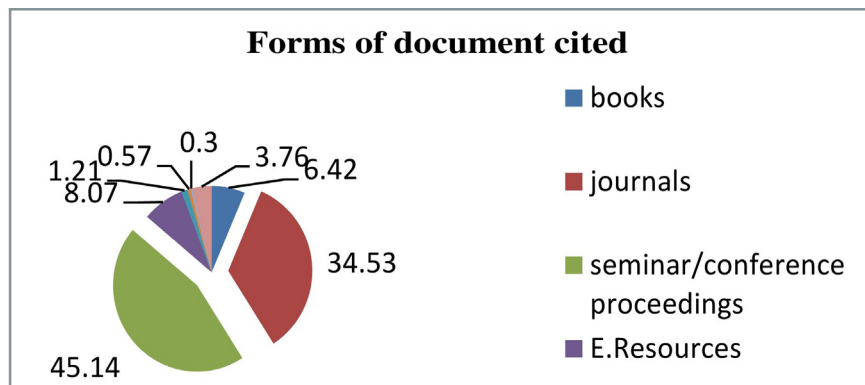


Figure 3. Forms of document cited

- 3) Average degree of collaboration is 0.99.
- 4) Out of 735 articles published with highest 680 (94.66%) articles had page length in the range 11-15 pages.
- 5) The highest number of citations appeared in the year 2012 i.e., 4977 which is total number of citations as per 23503.
- 6) Its observed references ranging from 21_30 form the largest group, and references ranging from 1_20 form the lowest group.
- 7) The composition of citations indicates that the total number of citation documents were 23503 which includes 10609 (seminar/conference proceedings), 8115 (journal) and 884 (others- editorials, letters, notes and short surveys).

9. Conclusion

The journal aims to provide an opportunity for interactions between networking in computer science technology especially within the communications group to introduce new concepts, methodologies, systems and technology in the field. It is one of the most extensive journals that appear in the IEEE society. This study has proven to be useful tool in the assessment of research publication of scientists in Engineering and technology.

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