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Innovations and Transformations
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Editors

Dr. R. Sarangapani

Dr. V. Rajendran

Dr. M. Uma

Associate Editors

Dr. M. Uma

Dr. A. Sokkalingam

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+91-98941 49413

E-mail : sreekumarancomputers@gmail.com

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Authorship and Collaborative Patterns in IEEE/ACM Transactions on Networking during 1998-2017

Swarnamugi, V and Santhi, J. (Dr.)

Research Scholar, Bharathiar University,

Librarian, Arumugam Pillai Seethai Ammal College

Abstract

The paper investigates that the scientometric techniques were applied to analyze the authorship trend in the online journal of IEEE/ACM Transactions on Networking between 1998 and 2017. A total of 2535 articles and 8360 authors in the journal were examined by year and volume to ascertain authorship patterns, author productivity and degree of collaboration. All the studies point 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 Pattern, Degree of collaboration, Author productivity*

Introduction

Scientometrics is the field of study which concerns itself with measuring and analysing scientific literature. Scientometrics is a sub-field of bibliometrics. According to Bibliometrics is a set of methods to quantitatively analyse academic literature and scholarly communications. (Bellis, 2009). Scientometrics is the study of quantitative futures and characteristics of science, scientific research and scholarly communications. Scientometric and Bibliometric analysis is an appropriate tool to evaluate the trends and development of scholarly peer-reviewed scientific publications. According to these interpretations, the speciality scientometrics is restricted to the measurement of science communication. bibliometrics is designed to deal with more general information processes.

Scope of journal

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.4 the scope of the 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 twenty years published article period between 1998 – 2017.

Review of Literatures

Jayendra Kumar Singh (2012)⁵ has examined the bibliometric analysis of 221 papers of LIBRI Journals during the year 2001 to 2009. The study focuses on various aspects of LIBRI journal such as its Year-wise distribution of papers, authorship pattern, subject-wise distribution of papers, geographical distribution, citation pattern and length of papers. The study shows that out of 221 papers single authors contributed 124 (56.10%) articles while rest of 97 (43.90%) were contributed by joint authors. Subject wise distribution is maximum (37%) in the field of Public /Digital /Academic Libraries. India ranks at 11th position with 4 publications which shows its lower share in this journal.

Sorli-Rojo, A. and Mochon-Bezares, G.(2013) have focused bibliometric analysis of *Materiales de Construccion* Journal journals published articles Authors' productivity and collaboration, affiliation and nationality of authors, collaboration amongst institutions using techniques of social networks analysis, and the impact factor of the journal were analyzed. The authorship pattern predominant solo authors contributed much lower. Institutional productivity of countries, 216 institutions are based in 33 different countries the Position highest occupied by Spanish institutions (70.03%). The impact factor during the study period sees the position of *Materiales de Construccion* Journal improve considerably within the areas of construction and building and multidisciplinary materials science according to the JCR, thus raising their profile significantly.

R.Vijayanathan (2014) has examined that articles published in the Singapore journal of library and information management. The journal has 25 articles with 435 citations contained during the study period year 2010 to 2012. The highest number of research articles 7(28%) was published in the year 2009 while the lowest number 4(16%) of research articles were in the year 2010 and 2012 during the study period. The authorship pattern of contributions reveals that the collaboration (80%) authorship. The highest number of authors 45,(77.59%) were from Singapore and the lowest number of authors from Malaysia and Kuwait 3(5.17%) where as India has come in the second place 7(12.07%). The author Yeo Pin Pin has contributed more paper got first rank.

K.Ramesh and M.Jayaprakash (2016) have analyzed the growth of Open Source Library Software from IEEE database during the study period of the year 1994-2010. A total of published papers 223 appeared in during study period. Research output of highest number of articles 46 (20.63%) in the year 2009 followed by 38 (17.04%) in the year 2008. It reveals that multi-authorship contributions dominate this field of research. Ranking of documents shows that conference proceedings 186 (83.40%) and followed by journal articles 37(16.60%). They result shows that IEEE Conference publications are in more number than IEEE Journals. country wise distribution of the articles and reveals that 102 (45.74%) articles were contributed by the authors from USA, followed by Japan 52 (23.32%) and India contributed only 1(0.45%) article.

Vimlesh Patel (2018) has scientometric analysis the growth and development of publications output journal of computer science and Technology obtained from web of science.

The study reveals that total 485 records appended with 436 citations during the study period. It shows publication types such as article was 457 (94.23%) followed by number of Editorial Material 27 (5.57%), Proceedings papers number of papers were 26 (5.36%). The study reveals that most of the authors like publish papers in collaboration authorship. Zhang L, published highest number of papers, (i.e.) 11. Peoples R China is in the top geographical contributions with number of publications is 371 (76.50%). It was Chinese Academy of Sciences with number of Publications was 93(19.18%) is placed at first rank.

Objectives of the Study

The primary objective of this study was to understand the research growth of IEEE/ACM Transactions on Networking and contributor's research output in during the study period 1998 - 2017. The specific objectives are:

- To study the distribution of articles by year and Issues
- To study Authorship Pattern Analysis
- To Study Continent-wise Distributions
- To study Distribution of authorship collaborations
- To study Degree of collaboration – year wise distribution
- To Study Top 10 ranked list of most prolific contributor

Methodology and Data Collection

The required data have been collected from the IEEE EXPLORE website of IEEE/ACM Transaction on networking pertaining to period from 1998-2017. 120 issues of 20 volumes from 1998-2017 have been selected for the study. These data were organized, calculated, tabulated, analyzed and presented by using simple arithmetic and statistical methods in order to arrive for its result.

Data Analysis

Distribution of articles by year and issues

Table-6.1 shows that the growth trend of journal was linear. The number of publications is highest in 280 articles in the year 2016. The lowest number of publications in 65 articles in the year 1998 to 2017 out of the total contribution during the study period. The fluctuations in publication pattern were observed throughout the period of study.

Table – 6.1 Contributions of articles by year and issue

Year	Number of the articles/contributions								
	Vol.No	Issue No.1	Issue No.2	Issue No.3	Issue No. 4	Issue No. 5	Issue No.6	Total No. of Articles	Percentage of Articles
1998	6	8	10	10	13	13	14	68	2.68
1999	7	11	10	14	10	14	13	72	2.84
2000	8	9	11	13	10	12	10	65	2.56
2001	9	9	8	11	12	12	13	65	2.56
2002	10	12	10	11	12	10	10	65	2.56
2003	11	12	12	13	14	14	11	76	2.99
2004	12	14	15	14	16	15	15	89	3.51
2005	13	16	18	19	17	20	16	106	4.18
2006	14	18	16	17	18	18	20	107	4.22
2007	15	19	18	19	19	18	31	124	4.89
2008	16	19	19	19	19	18	19	113	4.46
2009	17	27	24	25	25	25	25	151	5.96
2010	18	25	25	25	25	25	25	150	5.92
2011	19	23	24	24	23	24	23	141	5.56
2012	20	24	23	26	25	26	25	149	5.88
2013	21	25	24	25	24	24	25	147	5.80
2014	22	25	25	25	25	23	25	148	5.84
2015	23	24	25	25	25	24	24	147	5.80
2016	24	47	46	46	47	48	46	280	11.06
2017	25	46	45	46	46	44	45	272	10.73
		413	408	427	425	427	435	2535	100

Authorship Pattern Analysis

The table 6.2 reveals analysis found that 8360 authors have contributed 2535 items during the period between 1998 and 2017. The per capita authorship is Total Number of items / Total Number of authors the per capita publication works out to 30.32. The table shows the range of percapita ranged from 0.24 to 0.41. The percapita authorship in the years 1999 was 0.41 which decreased to 0.24 in the year 2017. This shows that as the number of authors increased the number of publication also increased.

Table 6.2 Authorship Pattern Analysis

S. No	Year	No of Authors	No of Papers	Percapita Authorship
1	1998	177	68	0.38
2	1999	177	72	0.41
3	2000	174	65	0.37
4	2001	187	65	0.35
5	2002	194	65	0.34
6	2003	208	76	0.37
7	2004	244	89	0.37
8	2005	295	106	0.36
9	2006	313	107	0.34
10	2007	370	124	0.34
11	2008	319	113	0.35
12	2009	458	151	0.33
13	2010	480	150	0.31
14	2011	463	141	0.30
15	2012	520	149	0.29
16	2013	536	147	0.27
17	2014	541	148	0.27
18	2015	528	147	0.28
19	2016	1054	280	0.27
20	2017	1122	272	0.24
	Total	8360	2535	30.32

Distribution of Authorship Collaborations

Table-6.3 shows the trend of Authorship pattern of Networking research. Single authored publications are as low as 3.59 per cent while collaborative authorship pattern is maximum (96.41 percent). According to authorship distribution, the single author publication of articles occupied the lowest position and with 3.59 percent, the double authorship publication accounts to 29.35 per cent while multiple authored publications are occupied the highest position with 67.06 percent.

Table 6.3 Distribution of Authorship Collaborations

Sl.No.	Types of Authorship	Frequency	%
1	Single	91	3.59
2	Double	744	29.35
3	Multiple	1700	67.06
	Total	2535	100

Degree of collaboration – year wise distribution

The above analysis reveals that the degree of collaboration has shown an increasing trend during the study period. To determine degree of collaboration in quantitative terms, the formula given by K. Subramaniam¹⁰ was used. This brings out clearly the high level of prevalence of collaborative research in the field of Networking. Degree of collaboration had an initial value of 0.91 per cent in the year 1998 and this trend increased to 0.97 per cent in the year 2017. There was a decreasing trend in the single authored papers and an increasing trend in multi authored papers

Table 6.4 Degree of collaboration – year wise Distribution

Year	Single Authorship	Collaborative Authorship	Degree of Collaboration
1998	6	62	0.91
1999	8	64	0.88
2000	3	62	0.95
2001	4	61	0.94
2002	6	59	0.91
2003	2	74	0.97
2004	7	82	0.92
2005	5	101	0.95
2006	4	103	0.96

Year	Single Authorship	Collaborative Authorship	Degree of Collaboration
2007	3	121	0.98
2008	7	106	0.94
2009	5	146	0.97
2010	6	144	0.96
2011	2	139	0.98
2012	0	149	1
2013	1	146	0.99
2014	2	146	0.98
2015	3	144	0.98
2016	8	272	0.97
2017	9	263	0.97
	91	2444	0.96

Continent-wise Distributions of authors

On the whole of 8360 authors belonging to six continents contributed a total of 2535 articles. The table 6.5 shows that 5004 (59.86%) of the authors are geographically affiliated to continent of North America, followed by 1911(22.86%) with Asia and Europe with 1326 (15.86%) and Australia with 99 (1.18%) and south America with 18 (0.22).Africa shares the last place with 2(0.02%).

Table-6.5 Continent-wise Distributions of authors

Sl.No.	Continent	No of Author	Percentage
1	Asia	1911	22.86
2	Australia	99	1.18
3	Africa	2	0.02
4	Europe	1326	15.86
5	North America	5004	59.86
6	South America	18	0.22
Total		8360	100.00

Top 10 Ranked List of Most Prolific Contributor

Table 6.6 shows that prolific authors of the articles during the period under study. It is clear from the table that Ness B. Shroff, The Ohio State University, Columbus, OH, United States were contributed highest number of articles for the study period with 50 (1.97%), records, next author, namely R. Srikant 36 (1.42%) with affiliated University of Illinois at Urbana-Champaign United States and geographical area United States respectively.

Table-6.6 Top 10 Ranked List of Most Prolific Contributor

Sl.No.	Author	Country	No of Publications	Rank
1	Ness B. Shrof	United States	50	1
2	R. Srikant	United States	36	2
3	Eytan Modiano	United States	32	3
4	Alex X. Liu	United States	30	4
5	Don Towsley	United States	29	5
6	Ian F. Akyildiz	United States	23	6
7	Shigang Chen	United States		6
8	Dmitri Krioukov	United States	22	7
9	Kang G. Shin	United States		7
10	Reuven Cohen	Italy		7

Conclusion

It is one of the most extensive journals that appear in the IEEE society. This study has highlighted quantitatively the contributions made by the researcher the year 1998-2017. The journal published 2535 articles and total number of authors 8360 during the study period. The year 2016 shows highest number of contributions 280 (11.06 %). The per capita authorship in the years 1999 was 0.41 which decreased to 0.24 in the year 2017. Multiple authored publications are occupied the highest position with 67.06 percent. The degree of collaboration is 0.96, which indicates its dominance upon multiple author contributions. The highest number of the authors are geographically affiliated to the continent of North America (59.86%). Ness B. Shroff, The Ohio State University, Columbus, OH, United States were contributed highest number of articles for the study period with 50 (1.97%) records.

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