Scientometric analysis of "IET Computers & Digital Techniques': 2007-2016

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Abstract - *This paper aims to perform a scientometric analysis of IET Computers & Digital Techniques to find out the quality, popularity and impact of the international journal published by IET Digital Library. Scientometric analysis of ten volumes from the year 2007 to 2016of IET Computers & Digital Techniques covering 40 issues containing 461 contributions was performed. All the bibliographic details were noted and recorded in tabular form for the purpose of in-depth analysis. Based on the analysis of the recorded data, findings have been presented. The study shows a trend of gradual growth in contributions published during the period of study, with an average number of 46.1 contributions per volume of the journal. Maximum number of contributions/research papers (82) were found to be published in the year 2007, whereas the minimum (38) in the year 2016.*

Keyword: Digital Techniques, CAD/EDA tools ,Content analysis, Bibliometrics, Citation analysis, Scientometrics, Authorship pattern

Introduction

Printed academic journals are the major avenues through which scientists communicate with each other their scientific results, their opinions, and many times exchange observations (Campanario, 1998) Scientific journals are the means by which the scientific community certifies accumulations and additions to its body of accepted knowledge and the means through which scholars are competing (Hargens, 1988)

Periodicals are primary source of information and an important media for communication. They play a fundamental position because communicating the latest lookup findings via publishing articles containing the cutting-edge development into somebody area on knowledge. Information is certain about the almost vital sources because a state to that amount varieties the fundamental wretched because of its economy. Information is rising outdoors of an exponential quantity as is fast referred in accordance with as like facts explosion. Periodicals guide is also growing epoch by season seeing that the forward scientific journal started publication among 1665. Periodicals are the indicators of literature growth in any field of knowledge. The advent about Internet technological know-how has carried to changes among the pathway journals operate, which includes quicker comment times, electronic submissions yet tracking, or online publications. Online get right of entry to concerning scientific composition has delivered colorful changes in the path knowledge is shared yet disseminates due after its effortless availability.

Scientometrics is a discipline which analyses scientific publications to explore the structure and growth of science. The bibliometric / scientometric / informetric techniques used to analyze various quantitative or qualitative aspects of a publication. It is a scientific field that studies the evolution of science through some quantitative measures of scientific information, as the number of scientific articles published in a given period of time, their citation impact, etc. The history of science and technology, philosophy of science and sociology of scientific knowledge are the related fields of Scientometrics.

Bibliometrics / Scientometrics research includes studies related to the scattering & growth of literature, author productivity, obsolescence of documents, distribution of scientific literature by country, by language, etc, which helps to monitor the growth & pattern of research.

Pritchard (1969) described the Bibliometrics as the application of mathematics and statistical methods to books and other media.

Scientometrics applies the bibliometric techniques to science and examines the development of the sciences (Virgil Diodato, 1994)

About the IET Computers & Digital Techniques

IET Computers & Digital Techniques publishes technical papers describing recent research and development work in all aspects of digital system-on-chip design and test of electronic and embedded systems, including the development of design automation tools (methodologies, algorithms and architectures). Papers based on the problems associated with the scaling down of CMOS technology are particularly welcome. It is aimed at researchers, engineers and educators in the fields of computer and digital systems design and test. Frequency of the Journal is 6 issues per year, ISSN: 1751-8601, Journal Impact Factor 0.589, CiteScore: 1.060, SNIP: 0.722, SJR: 0.210. Journal coverage's Design Methods and Tools: CAD/EDA tools, Simulation, Test and Validation, Processor and System Architectures, Configurable Computing, Design for variability, power and aging and case studies on emerging applications, applications in industrial designs, and design frameworks

Review of Literature

Kannappanavar B U, Swamy C & Vijay Kumar M (2004) analyzed the publishing trends of Indian Chemical Scientists during 1996 – 2000, which revealed average number of authors per paper has increased from 7.52 to 8.39. **Thanuskodi (2011)** carried out Bibliometrics analysis of the journal titled "Library Herald" published during 2006-2010. The studies showed that out of 138 articles 72(52.17%) articles were single authored while 66(47.83%) articles were contributed jointly. It also showed that (89.85%) were from India and the rest (10.15%) were contributed from foreign sources. **Santhi and Jeyachitra (2015)** 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. **Sujatha and Padmini (2015**) analyzed 3442 papers published in the journal IEEE Transactions on Antennas and Propagation during the period 2010-2014. They found that on an average 688 papers are published annually between the above said period. Number of publications in the journal from Indian authors was found to be very less as compared to European and Western countries. **Paramasivam and Venkatachalam (2015)** examined the journal titled "The Indian concrete" Journal from January 2012 to December 2012. The study revealed that maximum number of papers have been written by 23(39%) of two authors in the articles contribution, which shows collaborative research practice in The Indian Concrete Journal articles are mostly cited from Journals, Books, Conferences, Proceedings and Technical Reports, ASTM standards

Objectives of the Study

The objectives of this study are:
- To map the year wise distribution of papers
- To examine the authorship pattern & author productivity
- To determine the degree of collaboration
- To identify collaborative pattern
- To find the average length of papers

Sources of Information

IET Computers & Digital Techniques, Vol.1 (2007) to Vol. 10 (2016) in online at (http://digital-library.theiet.org/content/journals/iet-cdt/11/6.) is the primary sources of information to collect the data.

Methodology

The bibliographic records for the analysis are limited to the articles of IET Computers & Digital Techniques published during 2007-2016. Information regarding citation is collected from online IEEE Explore Database. These are recorded, tabulated and analysed considering the citation ear, cited journals, subject area of citation.

Results and Discussion
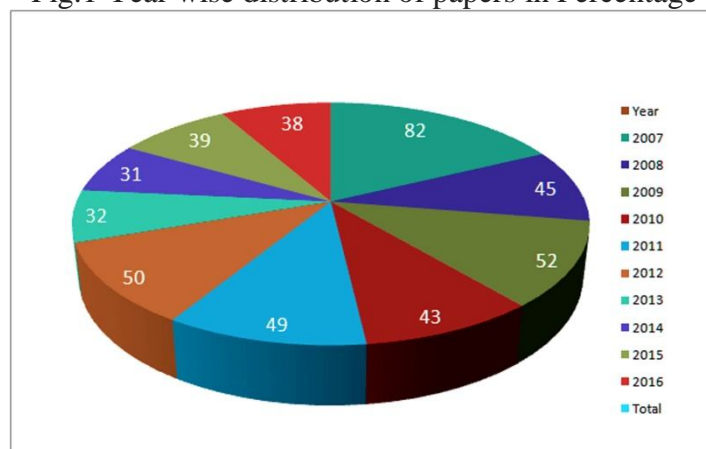
Year wise distribution of papers

Table-1 shows the distribution of research articles published in IET Computers & Digital Techniques during 2007 – 2016. The total of 461 research articles was published with an average of 46.1 articles per year. Out of 461 articles, the highest number of research articles were published in the year 2007 with 82 research articles followed by 52 articles in 2009 ; 50 articles in 2012 ; ; 49 articles in 2011 ; 45 articles in 2008 ; 43 articles in 2010; 39 articles in 2015; 38 articles in 2016 ; 32 articles in 2013; 31 articles and the lowest number of articles were published

in the year 2014 (5.1 articles per issue). The average number of papers per year is 46 during the study period.

Table-1: Year wise distribution of papers

S.No.	Year	No. of Articles	%
1	2007	82	17.79
2	2008	45	9.76
3	2009	52	11.28
4	2010	43	9.33
5	2011	49	10.63
6	2012	50	10.85
7	2013	32	6.94
8	2014	31	6.72
9	2015	39	8.46
10	2016	38	8.24
Total		**461**	**100**

Fig.1 Year wise distribution of papers in Percentage

Year and Issue-wise Distribution of papers

Table-2 indicates the issue no-wise distribution of research articles published in IET Computers & Digital Techniques during 2007–2016. The total of 461 research articles was published within the 10 years, highest articles in issue no.4 in 2007, followed by 21 articles in issue no.1, in 2012; 14 articles in issues no.4 in 2011; 12 articles in issue no.1 & 5 in 2009 and 10 articles in issue no.5 in 2016 and remaining very few article 4 to 7 articles in every issue of in IET Computers & Digital Techniques journal.

Table-2: Year and Issue-wise Distribution of papers

S.No.	Year	Issue No.1	Issue No.2	Issue No.3	Issue No.4	Issue No.5	Issue No.6	Total
1	2007	6	10	14	20	24	8	82
2	2008	9	7	8	7	7	7	45
3	2009	12	7	7	6	12	8	52
4	2010	7	5	9	8	8	6	43
5	2011	6	8	8	14	7	6	49
6	2012	21		6	7	8	8	50
7	2013	6	5	4	4	4	9	32
8	2014	5	5	5	4	4	8	31
9	2015	9	5	5	9	5	6	39
10	2016	5	6	6	6	10	5	38
Total		86	58	72	85	89	71	461

Authorship Pattern

It is observed from the Table-3, out of 461 papers, the highest number of papers was published by three authors and it accounts for 139 with 30.15% followed by two authored articles account for 121 with 26.25%.; 88 (19.09%)of articles were published by four authors. 50(10.85%) of articles were published by single authors. 38(8.24%) of articles were published by five authors. Only 25(5.42%) of articles were published by more than five authors. But the trend of the author pattern in the journal shows that the team size was three to two.

Table-3: Authorship Pattern

S.No.	Authors	No. of Articles	%
1	Single Author	50	10.85
2	Two Author	121	26.25
3	Three Author	139	30.15
4	Four Author	88	19.09
5	Five Author	38	8.24
6	Six Author	25	5.42
Total		461	100

Authorship Pattern Year wise

Table-4 indicates Year-wise authorship pattern of contribution by year. It shows that out of 9 contributions by single authors, in year 2007 has highest 28 papers. Where as the year 2009 & 2011 has the lowest number i.e., 2 contributions. Out of 121 articles by two authors, year 2007 has highest 28 and 2015 has the lowest number i.e., 3 of publications. Out of 139 contributions by three authors, 2007 indicates highest number i.e.,19 and 2014 has lowest numberi.e.,7 of contribution has made. Out of 88 contributions by four authors, year 2007 indicates highest number i.e.,20 and year 2010 has the lowest number i.e., 4 of contributions. It shows that out of 38 contributions by five and above authors, year 2009 has highest i.e., 8 whereas the year 2012

has the lowest number i.e., a single article contributions. Out of 25 contributions by six authors, 2007 indicates highest number i.e.,7 and 2012 & 2014 has non of contribution has made.

Table-4: Authorship Pattern Year wise

S No.	Year	Single Author	Two Authors	Three Authors	Four Authors	Five Authors	Six Authors	Total
1	2007	3	28	19	20	5	7	82
2	2008	6	11	15	7	5	1	45
3	2009	2	15	12	12	8	3	52
4	2010	3	14	15	4	3	4	43
5	2011	2	18	19	4	3	3	49
6	2012	7	14	15	13	1	0	50
7	2013	5	3	11	8	4	1	32
8	2014	6	9	7	6	3	0	31
9	2015	7	3	15	6	5	3	39
10	2016	9	6	11	8	1	3	38
Total		50	121	139	88	38	25	461

Most Proliferent Authors

Table-5 shows the most Proliferent authors in out of 461 contributions the most Proliferent author is 'Pomeranz' contributed 23 papers, followed by 'S. M. Reddy' with 13 papers; there were 3 authors contributed each of 6 papers; 5 papers by five authors and remaining seven authors contributed each of four papers.

Table-5: Most Proliferent Authors

S.No.	Authors	No. of Articles	Ranking
1	Pomeranz	23	1
2	S. M. Reddy	13	2
3	Wang	7	3
4	A. Yakovlev	6	4
5	J. L. Nunez-yanez	6	5
6	Mitra	6	6
7	H. El-Maleh	5	7
8	Hosseinabady	5	8
9	Liu	5	9
10	P. Dasgupta	5	10
11	T. Kondo	5	11
12	Chen	4	12
13	D. K. Pradhan	4	13
14	K. Chakrabarty	4	14
15	K. Goossens	4	15
16	P. y. k. Cheung	4	16
17	She	4	17
18	Y. Hur	4	18

Author Productivity

The data pertaining to author productivity has presented in the Table 6. The table shows that the total average number of authors per paper is 4 for the 461 articles. The years 2007, 2009,2013 & 2015 has the relatively equal average number of authors per article when compared the total average number of authors per article. The average productivity per author is 0.25 during the year 2007-2016. The years 2008, 2011 & 2016 has the relatively equal productivity per author when compared to the average productivity. Productivity has been calculated with the following formula (Fuyuki, 2009)

Average Authors per Paper = No. of Authors / No. of Papers

Productivity per Author = No. of Papers / No. of Authors

Table-6: Author Productivity

S.No.	Year	No. of Articles	Total No Authors	AAPP	Productivity per Author
1	2007	82	338	4.12	0.24
2	2008	45	176	3.91	0.26
3	2009	52	223	4.29	0.23
4	2010	43	170	3.95	0.25
5	2011	49	190	3.88	0.26
6	2012	50	187	3.74	0.27
7	2013	32	133	4.16	0.24
8	2014	31	115	3.71	0.27
9	2015	39	161	4.13	0.24
10	2016	38	144	3.79	0.26
Total		**461**	1837	3.98	0.25

Year-wise distribution of Pages

Table 7 shows that 461 papers published with a total page of 4607 (average 10.01 pages per article) during the year 2007-2016. It is observed that the average length of the articles varied from a minimum of 8.3 pages to a maximum of 12.8 pages. The year 2010 has highest average pages per paper with 12.8 pages while the year 2016 has the lowest average pages per paper with 8.3.

Table-7: Year-wise distribution of Pages

S.No.	Year	No. of Articles	Total Pages	Average pages per Article
1	2007	82	714	8.7
2	2008	45	487	10.8
3	2009	52	665	12.8
4	2010	43	522	12.1
5	2011	49	489	10.0
6	2012	50	474	9.5
7	2013	32	312	9.8
8	2014	31	298	9.6
9	2015	39	332	8.5

10	2016	38	314	8.3
	Total	461	4607	10.0

Findings

The analysis revealed the following conclusions.

- The maximum number of papers published in 2007 and minimum in 2014.
- The highest number of research papers contributed by three authors during the study period.
- The author productivity is 4 and the average number of authors per paper is 0.25.
- The average pages per paper are 10.01.

Conclusion

The publishing trend totally depends on the productivity of contributors, pattern of contributions and the quality of information. The analysis explores that the majority of papers by three authors. The average pages is 10.01and it is the ideal for research papers. The study revealed that the journal seems to be popular among the international research community with around 46.1% of papers. A significant note of the study is that the majority of the articles are contributed by co-author. A notable attribute of this study is that, this journal really stipulates / induces fruitful research for the researcher. Today, we see that research is done in almost all the branches of knowledge, especially in science and technology.

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