

Journal of American Computing Machinery: A Citation Study

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Abstract – This paper describes about the citation study on the Journal of American Computing Machinery. A Total of 10 volumes of the Journal of American Computing Machineries (2002-2011) have been taken for the study. The study included in analyzing the Year Wise and Volume Wise Distribution of Citations, Number of Citations in Articles, Quantitative Growth Articles by Volume, Cited Documents in the Journals, Authorship Patterns of Citations (Volume Wise) etc. The result of the study reveals that the general publication of articles in citation of the journals take the predominant representations role.

Keywords: Citation study, Citation analysis, Citation coupling

I. INTRODUCTION

Analysis of citations is common in the sociology of science. Approaches to citations-citation patterns or citation behavior-allows deriving maps of the structure of scientific specialties or disciplines and helps to construct typologies of different varieties of references and citations by content analysis (Gilbert 1977). In the process of citation analysis citations explore the structure of science. The primary idea goes back to Derek de Solla Price, who documented the growth of scientific literature in his book Little Science, Big Science (1963).

Periodicals are sensitive indicators of the emerging new ideas in any discipline. A careful evaluation of periodical literature may indicate a complete picture of the discipline. Citation analysis reveals interesting information about knowledge producers in terms their information seeking behavior and usage of various information sources. Citation analysis examines the frequency, patterns and graphs of citations in articles and books (Garfield, 1983).

ISI's citation-based databases index these intellectual transactions by tagging and listing both the cited and citing works. These reference-citation pairs can be described in many ways. The cited work reference is a paper or book that has been mentioned in the bibliography or footnotes of a citing work source. The source work contains the cited references. Citation indexes were designed to facilitate

information retrieval and dissemination using these source-reference connections. As a consequence, the ISI databases enable us to navigate the literature in unique ways.

II. REVIEW OF LITERATURE

Hsiao, C.H., Yang, C. (2011) explains a visual mapping of intellectual structure in two-dimensions and to identify the subfields of the technology acceptance model through co-citation analysis. Maz-Machado, A., *et al.* (2010) describes bibliometric analysis was performed of the scholarly production of the University of Malaga published during 1998-2007 in journals indexed in the Social Sciences Citation Index as accessed through the Web of Science. Sanni, S.A., Zainab, A.N. (2010) determines the influence and impact of journals which are not covered by the ISI databases and Journal Citation Report.

Karahoca, D. and Uzunboylu, H. (2010) The study examined research and trends in career counselling published in selected professional sources during the period 1980-2010. Mukherjee, B. (2009) using 17 open-access journals published without interruption between 2000 and 2004 in the field of library and information science. This study compares the pattern of cited/citing hyperlinked references of Web-based scholarly electronic articles under various citation ranges in terms of language, file format, source and top-level domain.

Calver, M.C. and Bryant, K.A. (2008) has analysed Pacific Conservation Biology's authorship and readership from 1993-2007 to quantify who publishes in the journal, who cites the journal, how the journal compares to other conservation journals and whether there are trends in authorship and use age over time. Dervos, D.A., Klimis, L. (2008) reports on the utilization of the cascading citations indexing framework (C2IF) for the identification of similarities among items in a bibliographic database.

Nkiko, C. and Adetoro, N. (2007) reports a citation analysis of the pioneer Covenant University bachelor degree students' research project reports of 2006, accepted by the

university academic departments and submitted to the university library. Goss, D.A. (2006) study is to compare citation patterns in the clinical binocular vision literature of optometry and ophthalmology.

III. OBJECTIVES OF THE STUDY

The researcher has framed the following objectives for the purpose of the present research.

1. To find out self citation.
2. To find out the authorship pattern.
3. To find out the pattern of citation.
4. To find out the page numbers in citations.
5. To find out the total number of citation.
6. To find out the subject-wise citation.
7. To find out year-wise citation from 2002 to 2011.

IV. METHODOLOGY

The present study “Journal of American Computing Machineries: A Citation Study” has been selected as the source journal.

A Total of 10 volumes of the Journal of American Computing Machineries (2002-2011) have been taken for the study. The details regarding each published article such as title of the article, number of authors, their institutional affiliations and addresses, number of reference with list, page number, number of tables and figures etc., were recorded and analyzed for making observations. Tables are filled by tally mark system counting one by one reference and other data. The data has been calculated and represented in tables. The emphasis is largely on quality forms and age of citations rather than on the subject content and the degree of its relevance to the citing documents. The citations were counted by the type of document and volume wise. As data sources, the study used reference lists of all theses published in American computing Machinery Journals from 2002 to 2011. The total number of data sources was 10 volumes and they covered the period 2002 to 2011. The emphasis is largely on quality forms and age of citations rather than on the subject content and the degree of its relevance to the citing documents. The citations were counted by the type of document and volume wise.

A. Data Collection

Journal of American Computing Machineries chosen for Citation analysis of Research Productivity in the field,

because the journal has grown in status and set its own standards in professional Journalism. It is a national periodical completely dedicated to the field of computer science serving the professional community by publishing papers on diverse aspects duly encouraging the authors young and old around the globe.

V. ANALYSIS AND INTERPRETATION

The data is collected from the Journal from library, PSGR Krishnammal College for Women Coimbatore, and ACM online journal.

The Table I describes the year wise and volume wise distributions of citations. In the year 2004 and in volume 51 there are 1361 (12.57%) of citation and it is highest of all the years. In the year 2003 and in volume 50 there are 1219 (11.26%) second in all the years. From this it is clear that the citations are increasing in some years and at the same time it is also decreasing in some years.

The Table II describes about the citations in articles. The 21– 40 citations are presented in 152 articles and it is the highest among all the other categories. The 1– 20 citations are presented 81 articles and it is the second highest. The 41 – 60 citations in 66 articles and 61 – 80 citations in 17 articles and 81 – 100 citations in 7 articles. It is clear there is a difference in citation pattern and at an average usage of citation in articles are 21– 40.

The Table III describes the growth of articles by volume. In the year 2006 volume 53 there 40 articles and the percentage is 12.65% and it is the highest among all the other categories. In the year 2004, there are 38 articles and it is the second highest and the percentage is 11.73%. In the year 2003 and in volume 50, there are 34 articles and the percentage is 10.49%. From this it is clear that the articles in this journal are not constant in number and it has a difference in between each year.

The Table IV describes the cited documents in the journal. In the year 2002, there are 1000 cited documents and the percentage is 28.57% highest among all the other categories. In the year 2004, there are 618 cited documents and the percentage is 17.66% second in the year 2005, there are 523 cited documents and the percentage is 14.94% is third. There is a degressing trend in cited documents in the following years. From this it is clear that the cited documents are degressing year by year.

TABLE I YEAR-WISE AND VOLUME-WISE DISTRIBUTION OF CITATIONS

S.No.	Year & Volume	Total Citation	Cumulative	Percentage	Cumulative Percentage
1	2002/49	1000	1000	9.23	9.23
2	2003/50	1219	2219	11.26	20.49
3	2004/51	1361	3580	12.57	33.06
4	2005/52	1032	4612	9.53	42.59
5	2006/53	992	5604	9.16	51.75
6	2007/54	997	6601	9.20	60.95
7	2008/55	1088	7689	10.05	71.00
8	2009/56	1045	8734	9.65	80.65
9	2010/57	1121	9855	10.35	91.00
10	2011/58	975	10830	9.00	100
11	TOTAL	10830	10830	100	100

TABLE II NUMBER OF CITATIONS IN ARTICLES

S.No.	Year & Volume	1-20	21-40	41-60	61-80	81-100	Total Articles
1	2002/49	10	10	7	3	-	30
2	2003/50	10	12	7	4	1	34
3	2004/51	8	19	9	-	2	38
4	2005/52	6	17	5	1	1	30
5	2006/53	22	11	3	2	2	40
6	2007/54	8	17	5	2	-	32
7	2008/55	4	14	8	2	1	29
8	2009/56	4	19	7	-	-	30
9	2010/57	4	21	4	3	-	32
10	2011/58	5	12	11	-	-	28
11	TOTAL	81	152	66	17	7	323
12	PERCENTAGE	25.08	47.06	20.43	5.26	2.17	100

TABLE III QUANTITATIVE GROWTH ARTICLES BY VOLUME

S.No.	Year	Volume	No. of Articles	Cumulative Total	Percentage	Cumulative Percentage
1	2002	49	30	30	9.26	9.26
2	2003	50	34	64	10.49	19.75
3	2004	51	38	102	11.73	31.48
4	2005	52	30	132	9.26	40.74
5	2006	53	40	172	12.65	53.39
6	2007	54	32	204	9.88	63.27
7	2008	55	29	233	8.95	72.22
8	2009	56	30	263	9.26	81.48
9	2010	57	32	295	9.88	91.36
10	2011	58	28	323	8.64	100

TABLE IV CITED DOCUMENTS IN THE JOURNAL

S.No.	Year	Volume	No. of Cited Documents	Cumulative Total	Percentage	Cumulative Percentage
1	2002	49	1000	1000	28.57	28.57
2	2003	50	389	1389	11.11	39.68
3	2004	51	618	2007	17.66	57.34
4	2005	52	523	2530	14.94	72.28
5	2006	53	226	2756	6.46	78.74
6	2007	54	298	3054	8.51	87.25
7	2008	55	260	3314	7.43	94.68
8	2009	56	77	3391	2.20	96.88
9	2010	57	87	3478	2.49	99.37
10	2011	58	22	3500	0.63	100.00

TABLE V AUTHORSHIP PATTERNS OF CITATIONS (VOLUME WISE)

Year	Vol. No.	1 Author	%	2 Author	%	3 Author	%	>3	%	Total
2002	49	623	35.9	234	24.7	89	17.0	54	17.9	1000
2003	50	152	8.7	122	12.9	76	14.5	39	12.9	389
2004	51	295	17.0	167	17.6	88	16.8	68	22.5	618
2005	52	300	17.3	123	13.0	66	12.6	34	11.2	523
2006	53	77	4.4	72	7.6	51	9.7	26	8.6	226
2007	54	119	6.8	98	10.3	52	9.9	29	9.6	298
2008	55	89	5.1	79	8.3	62	11.8	30	9.9	260
2009	56	38	2.1	18	1.9	14	2.6	7	2.3	77
2010	57	32	1.8	25	2.6	21	4.0	9	2.9	87
2011	58	8	0.4	6	0.6	3	0.5	5	1.6	22
	Total	1733	100	944	100	522	100	301	100	3500

The Table V shows the trends in authorship pattern in citations, as single authored papers are leading in frequency of occurrence in the journal “American Computing Machineries” throughout the study and more interestingly this growth is continuous which indication about the future pattern in authorship. The difference in frequency can be analyses easily by plotting a graph based on above data.

The highest numbers of contributions in the category of single authorship are contributed in 2002 and 2005 which are 623 (35.97%) and 300 (17.3%) out of 1733 single authored papers while in the category of multi authored papers the highest number of contributions are contributed in the year 2002 having 377(21.3%) contributions out of 1767 contributions.

It is clear from the above analysis that the percentage of single-authored papers is more than that of multi authored papers. To determine the extent of collaboration in quantitative terms, the formula given by K. Subramanyam is used. The formula is

$$C = \frac{Nm}{Nm + Ns}$$

$$C = \frac{1733}{1733 + 1767} = 0.49$$

Thus the degree of collaboration in the journal “American Computing Machineries” is 0.49. This bring out clearly the prevalence of team research in library and information science field. The distribution of degree of collaboration over the years from 2002 to 2011 is presented in the above table.

TABLE VI SINGLE AUTHORED V/S MULTI AUTHORED PAPERS

Year	Single Author	%	Multiple Author	%	Total No. of Contribution
2002	623	35.9	377	21.3	1000
2003	152	8.7	237	13.4	389
2004	295	17.0	323	18.2	618
2005	300	17.3	223	12.6	523
2006	77	4.4	149	8.4	226
2007	119	6.8	179	9.9	298
2008	89	5.1	171	9.6	260
2009	38	2.1	39	2.2	77
2010	32	1.8	55	3.1	87
2011	8	0.4	14	0.7	22
Total	1733	100	1767	100	3500

TABLE VII DEGREE OF COLLABORATION

Year	Single Author	Multiple Author	Degree of Collaboration $C=Nm/Nm+N_s$
2002	623	377	0.62
2003	152	237	0.39
2004	295	323	0.47
2005	300	223	0.57
2006	77	149	0.34
2007	119	179	0.39
2008	89	171	0.34
2009	38	39	0.49
2010	32	55	0.36
2011	8	14	0.36
Total	1733	1767	0.49

TABLE VIII SUBJECT-WISE CONTRIBUTIONS

S.No.	Subject Fields	No. of Contributions	%
1.	Data Structure	967	27.6
2	Data Base Management Systems	844	24.1
3	Networks	355	10.1
4	Programming Languages	489	13.9
5	TCP/IP	145	4.1
6	Multimedia	101	2.8
7	Software /Testing	130	3.7
8	Hardware's & Servers	83	2.3
9	Project Management	85	2.4
10	Web Technology	256	7.3
11	Others	45	1.2
	Total	3500	100

The Table VIII shows that the various field of subject in Computer Science data structure, data base management systems, networks, programming languages, TCP/IP is dominating over other subject.

Out of 3500 contributions, highest are from the field of data structure with 967 (27.6%) contributions that include articles on data structure, 844 (24.1%) on database management system, study of dedication pages, citation analysis, citation profile of scientist and institutions and other related aspects.

Out of 3500 contributions, 489 (13.9%) are on programming language and networks 355 (10.1%), which includes various aspects of computer sciences covering different domains of knowledge.

Next comes TCP/IP includes 145 (4.1%) contributions covering on aspects of IT and its applications on protocols. All the other subjects includes in the citations are below these categories.

TABLE IX INSTITUTION - WISE DISTRIBUTION OF CITATIONS (VOLUME-WISE)

Institutions	49	%	50	%	51	%	52	%	53	%	54	%	55	%	56	%	57	%	58	%
University & college libraries	10	33.3	11	32.3	12	31.5	9	30.0	12	30.0	9	28.1	8	27.5	11	36.6	10	31.2	7	25.0
Institutions	7	23.3	8	23.5	9	23.6	8	26.6	10	25.0	9	28.1	7	24.1	7	23.3	8	25.0	7	.025
Res. Institutions/ laboratories	5	16.6	6	17.6	10	26.3	6	20.0	8	20.0	6	25.0	5	17.2	4	13.3	4	12.5	5	17.8
Organizations	5	16.6	6	17.6	5	13.1	4	13.3	7	17.5	5	15.6	4	13.7	6	20.0	5	15.6	4	14.2
Others	3	10.0	3	8.8	2	5.2	3	10.0	3	7.5	3	9.3	5	17.2	2	6.6	5	15.6	5	17.8
Total	30	100	34	100	38	100	30	100	40	100	32	100	29	100	30	100	32	100	28	100

TABLE X TYPES OF PUBLICATION CITED

Types of Publication Cited	No. of Citations	%	Cumulative
Journals	1625	46.4	1625
Books	537	15.3	2162
Seminars/Conference	277	7.9	2439
Web Resources	275	7.8	2714
Government Documents	159	4.5	2873
Reference Sources	152	4.3	3025
Reports	100	2.8	3125
Courseware's / Syllabus	100	2.8	3225
Thesis/Dissertation	114	3.2	3339
News Papers	47	1.3	3386
Miscellaneous	114	3.2	3500
Total	3500	100	

The Table X shows that types of publication cited, the journal occupies 46.4% citations which are in number 1625 out of total 3500 citations. Books and seminar/conference have 537 (15.3%) and 277(7.9%) citations respectively in their account. Web resources & Government have 275(7.8%) & 159 (4.5%) citations in its account out of total 3500 citations .Reports and have equal Courseware's /syllabus have equal number of citations i.e.100(2.8%).

VI. CONCLUSION

The findings of volume distribution of ACM citations research output bring out the facts that of the various sources of publications, the articles that appeared in journals record. In general publication of articles in journals takes

the predominant representations. It is due to the prevalence to greater level of provocative and dissemination effects of journals throughout the world.

Citation analysis was particularly useful because of the interdisciplinary nature of the new institute and the heavy reliance on journals. The data obtained from journal articles composed the majority of the literature used for nanoscience research, and showed which journal titles are used the most. Information obtained about journals not owned can be used in collection management decisions in the future. This study contributes to the extensive field of citation analysis but focuses on the most up to date information in order to evaluate an existing science collection and its relation to a new institute in a rapidly evolving field.

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