

Core Journal Analysis of Scientific Productivity of Anna University Faculty (1979-2014) for Cloud Enabled Digital Institution Repository

S. Bharanidharan, G. Krishnamoorthy and K. Selvamani
Department of Computer Science and Engineering, Anna University, 25 Chennai, India

Abstract: An extensive analysis is performed with the records published by Anna University faculty in core journals in the field of literature for the period 1979-2014. This study depicts the analysis of the records sourced from the scopus database which is one of the largest collection of peer reviewed literature in the area of scientific journals, books, conference proceedings and so on. The purpose of this study is to identify the literatures of Anna University faculty and perform the core journal analysis of those records. A total of 12746 records were identified as created by Anna University faculty, for the period of study. The 70.52% (8988) of all the cited records were “journal articles”. When these cited journals were categorized under three sectors, we observe: only 51 journals fell into sector-I, accounting for 33% of the total number of citations, sector 2 consisted of 298 journals, accounting for 34% of the total number of citations, the 82.58% of the journals cited fell in sector 3. The 329 journals are identified as core journals in the field of ‘literature covered by Anna University faculty’.

Key words: Digital repository, cloud computing, Anna University, Bradford’s Law, core journal analysis

1INTRODUCTION

This study aims to examine the records in the field of literature covered by Anna University faculty’ published in core journals. This study is aimed at analyzing the records of core journals where the research output of Anna University faculty is published and to use that information to enhance the digital institution repository. In the process of enhancement of digital institutional repository, this core journal analysis is performed sourcing records from the scopus database for the period 1979-2014.

Digital library stores information in electronic format for users to access along with the means for organizing, storing, retrieving, processing and analyzing it. Cloud computing is a new evolution for delivering IT services remotely, over the internet. It helps organizations and institutions to make use of required computing resources (e.g., Storage, Network, Servers etc.,) as a utility whenever it is needed. One of the main benefits of cloud computing is elasticity-computing resources can be increased or decreased as needed by users which in turn refers to elasticity of resources. Research productivity can be improved by optimizing delivery of core journals identified through bibliographic studies via cloud enabled digital institution repository.

Justification for the study: With the author being a professional employed in the University Library of Anna University, this study and analysis was performed to share the research contribution of this esteemed institution.

In order to improve the research contributions of Anna University, design and operation of digital institution repository with cloud computing can be undertaken to favor the core journals identified by this bibliographic study.

Anna University: Anna University established on 4th September 1978 offers advanced education in engineering, technology and allied Sciences catering the present needs of the scholar Society. At present there are 627 engineering colleges operational under Anna University. Anna University is a member of “Association of Indian Universities”, “Association of Commonwealth Universities” and partner of “UNESCO International Center for Engineering Education (UICEE)”. University Grants Commission (UGC) has accredited Anna University with five star status (highest rating in India) for excellence in technical education and it is among top Indian universities in terms of its scientific research output.

Literature review: Detailed analysis employing Bradford's Law was performed on the citations to arrive at the list of core journals in their fields (Wagner, 1997; Heine, 1998; Rao, 1998; Feicheng and Rui, 1999; Ramesh and Ramakrishnan, 2010; Bogaert *et al.*, 2000).

Indian studies on air pollution research covered in E-CD was analyzed. Bibliometric indicators concerning authorship pattern, ranking of core journals, ranking of core research institutions in India, relative growth rate and doubling time are used in the literature analysis.

The global output of "fiber optics" research was analyzed (Rajendran *et al.*, 2005). The study that are part of Ei-Tech Index database ranging between the years 1999 and till 2003 were a part of the study. The study also involved analysis of literature growth by authorship pattern, year wise, country wise by bibliographic forms, nature of research and ranking of core journals.

Studies were conducted on Indian contributions to the Field of Hepatitis (Ramesh and Ramakrishnan, 2010). Studies were done regarding contributions on diabetes (Krishnamoorthy *et al.*, 2009). Studies regarding Indian contributions to the field of HIV/AIDS were done and core journals were identified (Ramesh and Ramakrishnan, 2010). Studies on research contributions in the area of Hepatitis-C (Kumar *et al.*, 2012) and Hepatitis B (Ramakrishnan and Rajendran, 2004) were done.

The main aim in taking up the present quantitative analysis study of core journals is due to the fact that such quantitative analysis in the discipline of 'literature covered by Anna University faculty' has not been performed in the past. This was revealed when such review of literature has commenced.

Objectives: The objectives of this study are:

- To identify the growth of "Literature outputs of Anna University faculty"
- To categorise the core journals which cover the literature output of Anna University faculty. Bradford's Law of Scattering is used to categorize the same

MATERIALS AND METHODS

The records of study published by Anna University Faculty during the year 1979-2014 in different fields were explored in the scopus database and the bibliographic details were retrieved. Details of records involving author and title of publication, language in which the records are published, year and country of publication; address of the

authors etc., were collected. The retrieved records were changed to FoxPro and then loaded in SPSS for analysis. Key word "Anna University" was used for extracting the number of records available in the above said database.

This cited journal reference data was used to determine core journals and scatter within the field of "literature covered by Anna University faculty". Bradford's Law of Scattering (Bradford, 1948) calls for ranking a large number of cited papers by journal title in order of decreasing productivity of those titles. Cited journals are segregated in three sectors 1-3. Each sector comprises of one-third of the total cited references with subsequent sectors cited less than the previous one.

Bradford's Law of Scattering: The scattering phenomenon is described using the following formula:

$$F(x) = a + b \log x$$

F(x) is the sum total of references as contained in the first \times most productive journal with 'a' and 'b' as constants. Bradford's law has been found to be applicable to bibliographies as well as to larger aggregates of literature. Cited journals in Sector 1 and Sector 2 were identified as core references in the field of 'Literature covered by Anna University faculty'. Finally, the journals identified in the two sectors were classified sector-wise and the results have been used to identify the core journals in the field of 'Literature covered by Anna University faculty'.

Limitations: This analysis is restricted to the time span from 1979 till 2014 using SCOPUS database.

RESULTS AND DISCUSSION

Quantum of research outputs published in literature covered by Anna University faculty It is observed that a total of 12746 records on 'Literature covered by Anna University faculty' is covered in the scopus database for a period of thirty six years from 1979-2014.

Publication types distribution of literature covered by Anna University faculty: Table 1 reveals the distribution of the 'Literature covered by Anna University faculty' research output according to various publication types of scopus database (Fig. 1).

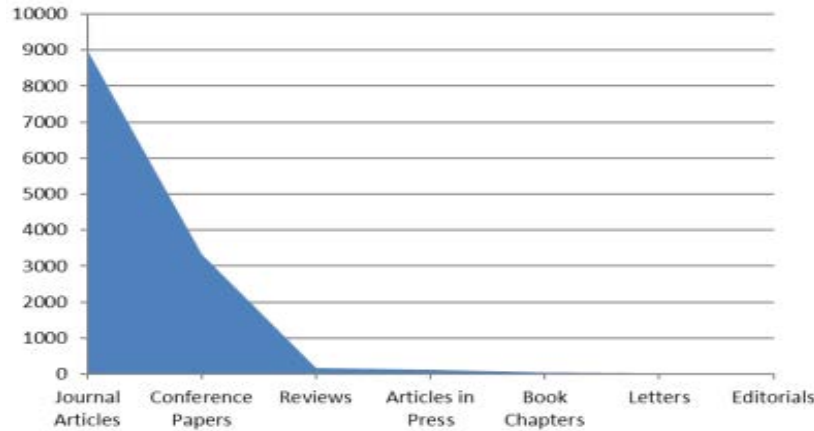


Fig. 1: Publication types of research output of Anna University faculty

Table 1: Publication types of research outputs of Anna University faculty

Publication type	No. of records	Percentage
Journal articles	8988	70.52
Conference papers	3326	26.09
Reviews	159	1.25
Articles in press	119	0.93
Book chapters	37	0.29
Letters	23	0.18
Editorials	17	0.13
Others	77	0.60
Total	12746	100.00

Table 2: Distribution by zone of cited journals and papers in literature covered by Anna University faculty

Zone	No. of journals		No. of papers	
	No.	Percentage	No.	Percentage
1	51	2.70	3012	33.51
2	278	14.72	3075	34.21
3	1560	82.58	2901	32.28
Total	1889	100.00	8988	100.00

Table 3: Top 10 core journals in literature covered by Anna University faculty

Name of the journals	No. of records	Percentage
European Journal of Scientific Research	315	3.50
Journal of Crystal Growth	196	2.18
Acta crystallographica section C		
Crystal structure communications	154	1.71
Journal of Computer Science	138	1.54
Journal of Theoretical and Applied Information Technology	137	1.52
Acta crystallographica section E		
Structure reports online	123	1.37
International Journal of Engineering and Technology	95	1.06
Materials Chemistry and Physics	87	0.97
International Journal of Soft Computing	83	0.92
Journal of Applied Polymer Science	83	0.92

Distribution by sector of cited journals and records in literature covered by Anna University faculty. A total of 1889 journals that were cited in the records were analyzed. When these cited journals were categorized under three

sectors only 51 journals fell into sector-I, accounting for 33% of the total number of citations, sector 2 consisted of 298 journals accounting for 34% of the total number of citations and 82.58% of the journals cited fell in sector 3 (Table 2).

There are 329 core journals (Table 3) identified in the field of “Literature covered by Anna University faculty”. For brevity the top ten journals as far as the “Literature covered by Anna University faculty” is concerned has been presented in Table 3.

Way ahead: In order to optimize the research contributions and overall efficiency of research work at Anna University, enhancement of the digital institution repository based on this bibliographic study can be undertaken. A synopsis of that is presented here in.

A digital library is the starting point

Digital library: The Library field has many opportunities with the application of information technology. Many academic institutions are building their own institutional repositories for various works-books, study, thesis, etc., to be digitalized and made available to the public. Digital library stores this information in electronic format for users to access along with the means for organizing, storing, retrieving, processing and analyzing it (Fig. 2).

Cloud computing: With increasing number of users and preference of accessing the information from any location, there is a need for a well distributed access and storage infrastructure for institution repositories and cloud computing adoption is the answer.

Cloud computing: Cloud computing is a new evolving paradigm and it is the third revolution in the field of

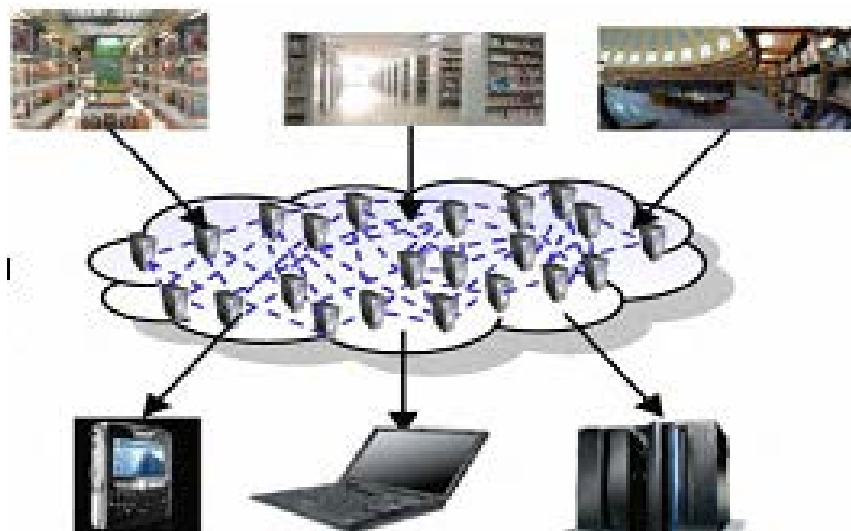


Fig. 2: Application of cloud computing in a digital library

information technology with the use of internet. Cloud computing can be viewed as a new evolution for delivering IT services remotely over the internet. Instead of building and maintaining a separate computing infrastructure, cloud computing helps organizations and institutions to make use of the required computing resources (e.g., storage, network, servers etc.) as a utility whenever it is needed. Hence, this enables institutions to invest less in server infrastructure and lower the cost for elastic computing resources. Also, the information management cost is highly reduced. The computing resources, information and software are accessed via the internet. One of the main benefits of cloud computing is its elasticity computing resources can be increased or decreased as needed by users based on demand.

Library services can be accessed anytime and anywhere with the integration of cloud technology. There are several library applications where cloud can be integrated and a few are listed as; searching data-using open source solutions and web management systems, libraries have already migrated to key services such as pre-indexed search engines in cloud. This facilitates the researcher, student and teacher to discover and share thesis, journal study etc., easily and quickly.

Data storage-cloud computing resources can be used to store library data and enable retrieval of those files over the internet using desktop and mobile browsers.

Library automation-library maintenance in the form of updates, backup and other such administrative activities which are currently automated using local servers and library management system software can be automated using cloud services. Digital libraries can adopt cloud

based solutions for various services including electronic journal access management, digital library hosting and statistics tracking.

Avoid redundancies and reduce resource usage: With cloud computing enabled digital libraries, cost of operation and efficient use of resources can be optimized by serving content of high relevance to its user group. This will help avoid redundancies and reduce resource usage.

If a journal, ex. Journal A is accessed very frequently on a campus, Campus 1, of a university, storing and accessing that Journal A on Campus 1 modules of the digital institution repository would lower cost of network, storage and hence, monetary resources that are required to deliver it to users there. It will also lead to faster retrieval and access for end users.

If another journal, ex. Journal B is accessed mostly from homes of users it can be hosted on cloud storage services. This will facilitate 24x7 access over the Internet, allowing retrieval using browser software and with no need for installing custom library software. Journals that are not frequently accessed can then be stored in archival systems and retrieved only in case of specific requests.

CONCLUSION

The majority of the records were journal articles. Fifty one journals fell into sector-I, accounting for 33.51% of the total number of citations, sector 2 consisted of two hundred seventy eight journals while >82.58% of the journals cited fell in sector 3. The 329 journals are identified as core journals in the field of literature covered by Anna University faculty.

For optimization of digital institution repository, the results of our study published in this study would help by showing the core journals of significance. They can then be prioritized for quick and efficient on-campus and remote access. Such an approach to saving content based on bibliographic study will help to optimize the digital institution repository with a view to enabling higher quality and quantity of research work by the institution.

REFERENCES

- Bogaert, J., R. Rousseau and V.P. Hecke, 2000. Percolation as a model for informetric distributions: Fragment size distribution characterised by Bradford curves. *Scientometrics*, 47: 195-206.
- Bradford, S.C., 1948. *Documentation*. Crosby Lockwood, London, UK.
- Feicheng, M. and Rui, C., 1999. Study on the laws of scattering distribution analysis from document level to content level (II): Scattering distribution of document unit by Frequency-rank analysis of Bradford's Law. *J. China Soc. Sci. Tech. Inf.*, 18: 171-182.
- Heine, M.H., 1998. Bradford ranking conventions and their application to a growing literature. *J. Doc.*, 54: 303-331.
- Krishnamoorthy, G., J. Ramakrishnan and S. Devi, 2009. Bibliometric analysis of literature on diabetes (1995-2004). *Ann. Lib. Inf. Stud.*, 56: 150-155.
- Kumar, D.K., Y.S.S.R. Murthy, D. Ramakrishna and A.V. Rohit, 2012. Application of cloud technology in digital library. *IJCSI. Int. J. Comput. Sci.*, 9: 374-378.
- Rajendran, P., B.R. Babu and S. Gopalakrishnan, 2005. Bibliometric analysis of fiber optics literature. *Annal. Lib. Inf. Stud.*, 52: 82-85.
- Ramakrishnan, J. and P. Rajendran, 2004. Mapping the Literature of Hepatitis B. In: *Information and knowledge Management in Health Sciences: Newer Perspectives*. Alm, W. (Ed.). University of Madras, Chennai, India, pp: 216-224.
- Ramesh, B.B. and J. Ramakrishnan, 2010. Indian Contributions to the Field of HIV-AIDS (1997-2006): A Scientometric Study. In: *Webometrics Infometrics and Scientometrics: Measuring Scientific and Technological Progress of India*, Sangam, S.L. (Ed.). Karnatak University, Dharwad, India, pp: 164-178.
- Rao, I.R., 1998. An analysis of Bradford multipliers and a model to explain law of scattering. *Scientometrics*, 41: 93-100.
- Wagner, D.R., 1997. Time dependencies of Bradford distributions: Structures of journal output in 20th-century logic and 19th-century mathematics. *Scientometrics*, 39: 231-252.