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Mathematical Science and its Application in Information Centres, Systems and Allied Organization

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Abstract – **Mathematics is one of the important areas of Pure Science. It is one of the oldest knowledge field proved useful in most of the industries, business, services and so on. Mathematics as well as statistics is also applicable in many subjects. Education, Computer Science, Environment Science, Biological Sciences and even humanities also need the assistance of mathematics immensely. Information Science is one the important subjects today responsible for information collection, organization as well as dissemination. The working area of Information Science is information centre, documentation centre, information system. There is a close relation between mathematical sciences and information foundations. In this paper we highlight basics about mathematics, statistical science used in information science. We describe the application of mathematics in information centers and allied fields.**

Keywords: **Mathematics, Mathematical Science, Statistics, Information Science, Information Systems and Subsystems, Information, Bibliometrics, Informatics, Fuzzy Logic, Information Retrieval System (IRS)**

I. Introduction

Both Pure and Applied mathematics have a relation and impact on information systems or centers. Statistical Sciences, Statistics has an independent and self sufficient status presently. Statistics is an academic field as well as a working area related to digit numbers. The main difference between mathematics and statistics is that, mathematics is responsible for formulation of logic, model; whereas statistics is responsible for the numerical presentation of information and their analysis. Both the subjects can be applied on information systems [12, 13].

II. Objectives

The main aim of this study are:

- To know the basis about the relevance of mathematics and mathematical sciences in information science;
- To learn about application of mathematical sciences in information science and its working area;
- To know the emerging mathematical areas applied on information systems and its subdivisions;
- To learn about informetrics and bibliometrics –their uses;
- To learn about fuzzy logic and its relationship with information foundation, such as information centre or information sciences.

III. Information Science and Information Systems

Information Science is an interdisciplinary field, which is mainly dedicated to information activities ranging from information collection, selection, organization, dissemination of information, data, knowledge and content. Information Science is mistakenly considered as a part of Computer Science. However Information Science is a broad subject or field of field [12]. Fundamentally Information Science is a combination of so many subjects like Information Technology, Computer Science, Information Technology, Management Science, Psychology, Philosophy, Communication Science, Cognitive Science [10]. Though information science today mainly considered as a combination of the following:

- Computer Science;
- Management Science;
- Cognitive Science;
- Documentation Studies and so on.

Information science has many working areas such as information system, information centre, documentation centre, data centre and so on. Information systems are the information hub which is actually a combination of information centers. An information system is responsible for collection and selection of information and data from its allied centers or sub centers or information centers. Fundamentally for information collection, organization, dissemination, budgeting, annual report preparation, computerized

information delivery, we need the use of mathematics and statistics [13].

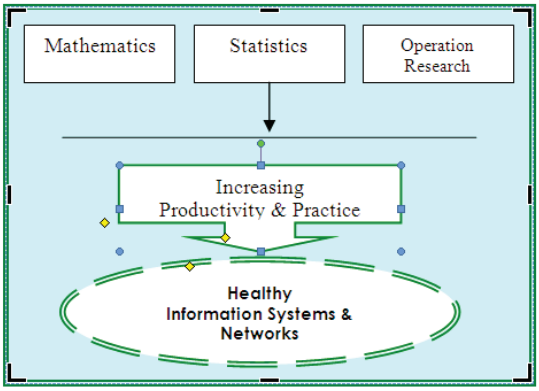

Fig. 1 Mathematical science in information activities

IV. Mathematical Sciences and Its Application In Information Systems - Academic and Working

In information collection as well as selection mathematical sciences play an important role. More interestingly for representation of facts and figures, we need to take the help of mathematical sciences. The practical base of statistical method is actually nothing but the quantitative analysis. In information systems statistical methods are used aggregating analysis and intensive study of individual units [12].

Data analysis is also an active research area of information systems. Data analysis refers to the computation of certain measure and searching for patterns of relationship that actually exists among the data group. Virtually, data analysis and inferential analysis depend on mathematics and statistical methods [04, 06, 12].

V. Use of Mathematical Sciences in Technical Activities of Information Systems

In the following technical areas mathematical science may be applied to the following:

- The mathematical techniques are useful in acquisition and selection of information systems, particularly for acquisition document management.
- Statistical techniques particularly diagrams are useful to know the classification systems. Classification completed within a particular period of time, scheme used and HR involve classification.
- In circulation section, statistical techniques are used to know how many documents are changed and discharged during a period and to whom these documents have been issued along with their sexual status.
- Similarly, in reference section mathematical calculation and diagram are useful to know what type of service has been offered during a period, frequency of service offered.
- In the reading room section, mathematical analysis and diagram are useful to know how many persons got the service from the information centre or system within a particular time, type of information service offered.
- In the internet section, with the help of statistical method it is possible to know which are the services; to whom, frequency offered by internet centre of the information centre and system.

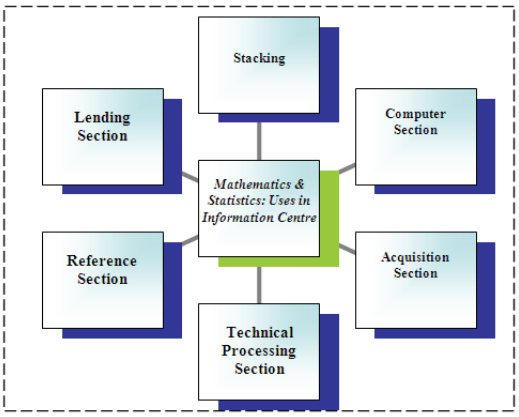

Fig. 2 Use of Mathematical techniques in information centers

VI. Informetrics

Information and use of statistical and mathematical techniques for this is called Informetrics. Informetrics is actually measurement of information and related facets [12]. The main aims of informetrics are:

- To measure information;
- To know the use pattern of a Research paper title/ book title;
- To know the trend of using a particular word or sentence;
- Information analysis and so on.

VII. Bibliometrics

Bibliometrics is another important branch of quantitative science. Bibliometrics is actually applicable in information centers and related organizations for quantitative analysis [13]. With the help of bibliometrics the following can be possible:

- Author Pattern;
- Subject Trends;
- Research Trends;
- Citation Analysis;
- Auto Abstracting;
- Publishing Trend. It is important to know past and present of the publishing trends.

Some of the reasons for which we need bibliometrics are as follows:

- To know dispersion of scientific literature;
- To identify the core research areas of a journal;
- To know the comprehensiveness of the secondary periodicals;
- To build future collection development;
- To help author; directly and indirectly;
- For auto indexing and classification.

VIII. Webometrics

When statistical techniques and mathematics are applied on website and webpage that is called in general 'webometrics'. Fundamentally webometrics means analysis of website. The main objectives of webometrics are as follows:

- Website measurement;
- Link analysis of a particular website;
- Architecture of a website;
- Information about webpage;
- To know the trend of a particular website;
- Frequency of using a hyperlink of the website;
- Frequency of using a hyperlink website;
- To know the number of visit a website or page;
- To learn user interest and trend; and so on.

IX. Fuzzy Logic In Information Retrieval

Fuzzy logic began in 1965 the notion of fuzzy set. The fuzzy based information retrieval is useful in providing right information to right user and in the right time. Fuzzy information retrieval method based on fuzzy set theory has been proposed for improving the disadvantage of Boolean logic model which can not handle uncertain information [08, 12]. The main role of fuzzy logic in information system or in academics of this field is as follows:

- Fuzzy logic basically has less coordination with fixed and exact data;
- It is able to process incomplete data and provide approximate solution;
- It is possible to provide information with accurate form;
- It is useful to utilize all types of data and information of the information centres;
- Mathematical analysis of an academic area of information system is possible.

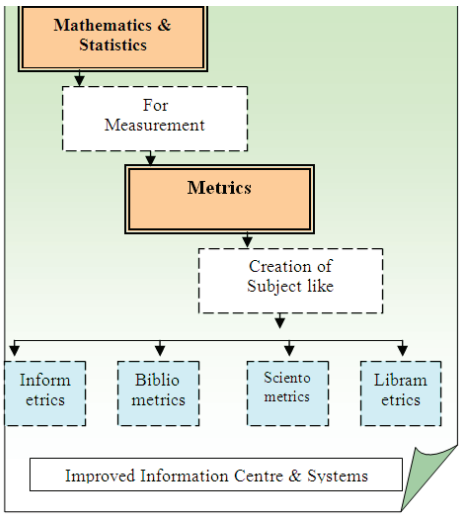

Fig. 3 Creation of new subjects

In the academic and research areas of information systems, we can also utilize mathematical science for the following purposes.

- To measure index number precisely;
- To scale the standard of living of two persons in the society;
- To measure information systems product and services such as electronic document, computer peripheral, CD-ROM and so on;
- To derive greater precision in our thinking [12, 13].

X. Findings

As far as our research is concerned we have noted the following things.

- Mathematical science has wonderful relationship with the traditional aspects of information science like-informetrics, bibliometrics as well as the emerging topic like information theory;
- Quantum informatics is an emerging fleld now;

- The scenario of informetrics and webometrics is fast changing day by day;
- For further development of information infrastructure mathematical science can play an important role.

XI. Further Research Scope

Researches in the following areas will enrich surely the related science and technology.

- Fuzzy based information retrieval system;
- Strategic model of cloud information system;
- Information analysis;
- Computational informetrics.

XII. Conclusion

Mathematics and Allied Science both have the credentials to make Information Centre to become much more advance and service oriented many a ways [02, 10]. Apart from big information systems & centre small information centre should use the mathematical tools, techniques and weapon for the betterment of information systems. The Annual report, decision making, Future services- directly & indirectly can be depend on Mathematical Sciences.

References

[1] "State of the CIO 2008 Data Shows CIO Salaries, Influence Rising". CIO.http://www.cio.com/article/147950/_State_of_the_CIO_2008_Data_Shows_CIO_Salaries_Influence_Rising. Retrieved 27 February 2010.

[2] http://en.wikipedia.org/wiki

[3] "State of the CIO 2008 Data Shows CIO Salaries, Influence Rising". CIO. http://www.cio.com/article/147950/_State_of_the_CIO_2008_Data_Shows_CIO_Salaries_Influence_Rising. Retrieved 27 February 2010.

[4] Should You Get an MBA?, CIO.com, Business Technology Leadership.

[5] Paul, Prantosh Kumar, Bhusan Bhusan Sarangi and Asok Kumar "Information Systems and Networks (ISN): its types, components with special reference to utilization and role of Networking and Communication Technologies in ISN - Contemporary Scenario", in IEEE/IETE/CSI Co-sponsored Nationnal Conference on VLSI,Embedded System & Communication Technology' ,Department of Electronica & Communication Engineering,AVIT (AICTE-NBA-VMU approved)

[6] Paul, Prantosh Kumar, Dipak Chaterjee and Bhaskar Karn, "Information Management: emphsizing traditional and technology focused approach – An Overview", accepted in in IEEE/CSI/AICTE co sponsored National Conference on Paradigm shift in Education Technology & Content Management,DIT,Techno India (AICTE-NBA-WBUT approved) Paper published

[7] Paul, Prantosh Kumar,Mrinal Kanti Ghose and Dipak Chaterjee, "Education Technology: its benefits and utilization with special reference to EduNxt, Knowledge Delivery Model of Sikkim Manipal University-A Study", in IEEE/CSI/AICTE co sponsored National Conference on Paradigm shift in Education Technology & Content Management,DIT,Techno India (AICTE-NBA-WBUT approved) Paper published

[8] Paul, Prantosh Kumar, Dipak Chaterjee and Bhaskar Karn, "Cloud Computing: Issues and challenges with probable solution in Indian Perspectives", *IJIDT International Journal of Information Dissemination & Technology,* MMU,Ambala. Vol.2, No.2.

[9] Paul, Prantosh Kumar, Dipak Chaterjee and Bhaskar Karn, "Information Management: Emphasizing its different angel and view with special reference to manpower development programme in India", *IJIDT International Journal of Information Dissemination & Technology,* MMU,Ambala, Vol.2, No.2.

[10] Paul, Prantosh Kumar and Shyamsundar Bairagya, "Management Science and its increasing influence and interaction with Information Science (IS): an Overview", in *International Conference on Emerging Market and Issues in Management,* [ICEMIM-12], VIT University,Vellore,16th March,2012.

[11] Paul, Prantosh Kumar and Kalyan Kumar, "Information Management & Its Needs with Focus on Job Based Versatile Academic Programmes", in India in International Conference on Emerging Market and Issues in Management, [ICEMIM-12], VIT University,Vellore,16th March,2012.

[12] Paul, Prantosh Kumar,Bibhuti Bhusan Bhusan Sarangi and Dipak Chatterjee, "Mathematics & Statistics: emphasizing its application and utilization in the working & academic area of Information Science (IS)-Contemporary Scenario", in National Conference of Mathematical Modeling and Simulation,Department of Mathematics,VMKV Engineering College (AICTE-NBA-VMU approved),11th February,2012,Salem,Tamil Nadu. Paper published

[13] www.en.wikipedia/information_science.