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Visualizing Google Scholar Profile of Dr. S.R. Ranganathan using PoP and VOSviewer: a tribute to Father of Library Science in India

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Abstract

Dr. Shiyali Ramamrita Ranganathan was the well-known librarian and mathematician from India. He was also called the father of Indian librarianship. He made India library conscious in particular and he influenced the thinking of library world in general. It is mainly because of his efforts that library & information science became a subject of study and research. Dr S.R. Ranganathan has recorded 307 publications since 1931 including his contributed books, book chapters, reports, and journal articles, texts of invited speeches or special lecture. He received a total of 5455 citations with h-index 27. Highest citations (306) were received in the year 2017. Also, it was observed, “The Five Laws of Library Science” published in the year 1931 received highest citation 1213. Most of his collaborative works or articles in total, are with Neelameghan, A and Gopinath, M A.

Keywords: VoSViewer, Publish or Perish, Google Scholar, S.R. Ranganathan, Bibliometrics, Co-authorship, Text map.

Introduction

Shiyali Ramamrita Ranganathan (Dr. S.R Ranganathan), (born August 9, 1892, Shiyali, Madras, India—died September 27, 1972, Bangalore, Mysore), Indian librarian and educator who was considered the father of library science and documentation and information science in India. He was a prolific scholar as-well-as thinker in the domain of library and information science (LIS) and had written several scholarly monographs and articles. One of Ranganathan's distinguishing characteristics was that he seeks philosophical foundations and scientific principles that can be used as the basis for the development of standard practices, tools, and techniques. His experience at the University of Madras library seems to have helped him identify areas and activities that require a scientific basis. In 1931, his exploration of philosophical foundations finally formed the Five Laws of Library Science, which was published as a book (Ranganathan 1931).

In the year 2015, Google Scholar Digest released an article, “Honoring the pioneers of Bibliometrics & Scientometrics / Library & Information Science by creating their Google Scholar Citations Profiles” to present a portal providing access to the bibliographic profiles- created on Google Scholar Citations- of 39 scholars, now deceased, who played an outstanding role in the creation and consolidation of the fields of Library and Information Science (29 profiles) and Bibliometrics (10 profiles). (“Google Scholar Digest: Honouring the Pioneers of Bibliometrics & Scientometrics / Library & Information Science by Creating their Google Scholar Citations Profiles”). Dr. S.R. Ranganathan was one of the 39 scholars. Google scholar profile of Dr S.R. Ranganathan has recorded 307 publications since 1931 including his contributed books, book chapters, reports, and journal articles, texts of invited speeches or special lecture. He received a total of 5455 citations with h-index 27. It is also interesting to note that his scholarly works are continually cited in contemporary time with an h-index 15 since 2016. (Das and Mishra)

Review of Related Literature:

Earlier various studies also revealed to analyze individuals' publication pattern whereas the initiative to collect Ranganathan's bibliographic data from Google Scholar via PoP and run it through VoSviewer is golden in this segment. However, some of the Scientometrics portraits of writers created by various authors using various methods are revealed here.

Fitria et al., (2022) conducted a study entitled "Bibliometric Using Vosviewer with Publish or Perish (using Google Scholar data): From Step-by-step Processing for Users to the Practical Examples in the Analysis of Digital Learning Articles in Pre and Post Covid-19 Pandemic" where the analysis was carried out using the number of publications obtained, summing 88 documents in 2017-2021, relating to the predetermined topics. Authors evaluated the analysis of digital learning articles in pre and post covid as practical examples. They found that VOSviewer can be used to give suggestions in the data analysis results.

Koley and Sen (2016) attempted to analyze the publications of V.L. Kalyane, one of India's pioneers of bibliometric studies. The study presents a scientometric analysis of 120 papers by Kalyane published between 1973 and 2009, with 338 co-authors. Dr. Atul H. Chokshi, a professor in the Department of Materials Science, Indian Institute of Science (IISc), Bangalore, India, led the study with Parvathamma, Nazneen Banu, and Shireen Kauser (2013). The professor has published 76 research papers in prestigious international and national journals, as well as 34 articles in conference proceedings, with a total citation count of 2820, and he is one of the top 100 most cited authors in Materials Science. The average annual scientific productivity is 04 research papers with 113 citations per year. Kavya et al., (2020) conducted a study based on the data from Web of Science on the profile of Badiadka Narayana, a Mangalore University professor of Chemistry, is a prolific writer in Chemistry and a well-known expert in Crystallography. His prolific writings are vividly documented by 691 articles in international journals, 49 in national journals, and 165 papers in conference proceedings. Between 2007 and 2011, a significant number of articles (392) were published. Narayana's papers have appeared in 325 (59.2%) of the international journals 'Acta crystallographica section e-structure'. The majority of his collaborative works, a total of 242 articles, are with H. S. Yathirajan and Sarojini Balladka K. Keshava Sedam and Mariraj (2012) attempted a scientometric analysis of André Geim's 184 publications published between 1981 and 2010. According to the study's findings, Andre Geim published two single-authored papers and 182 multi-authored papers between 1981 and 2010. Angadi et al. (2006) attempted to analyse the publication productivity of Anthony J. Leggett, the 2003 Physics Nobel Prize winner. His most productive years were 1987, 1994, and 1998, when he published ten papers each. During his publishing career, which lasted from 1964 to 2004, he had a total of 194 publications.

Rests of the part of literature review have an outline of Ranganathan's livelihood and contribution towards Indian library science. Anup Kumar Dasa and Sanjaya Mishrab (2016) highlighted an announcement by the Google Scholar Digest blog dated on June 8, 2015, about the availability of Google Scholar profiles of classic scholars in library and information science. Only one scholar, Dr. Shiyali Ramamrita Ranganathan, was selected from a group of 29. In his paper (Spanish), George Aguayo (1968) compared Ranganathan's contribution to library science to Einstein's contribution to physics. Dr. Eugene Garfield (1984) also stated, "Ranganathan is to library science what Einstein is to physics." Anup Kumar Dasa and Sanjaya Mishrab (2016) conducted a study "S R Ranganathan in Google Scholar and other citation databases". The paper analysed the scholarly contribution of S R Ranganathan as reflected in Google Scholar Citations, Web of Science, and Scopus. The study employed three citation databases Web of Science (Core Collection), Scopus and Google Scholar Citations to identify citing and cited scholarly works of S R Ranganathan. Encyclopedia of Library and Information

Science, Ed. by Allen Kent and others, Vol. 25, 1978, published by Marcel Dekker Inc., New York. "S.R. Ranganathan – A Short Biography"

Study Rationale and Significance:

There is no dearth of studies which have visualised the bibliographic data obtained from abstracting/indexing (A/I) and citation databases like Scopus and Web of Science (WoS). The authors could not find any study which has attempted to conduct a bibliometric or scientometric study based on data derived from open database Google Scholar (GS) with the help of popular scientometric or science mapping software like VOSviewer. Moreover, being a free database, more results were available in GS making it an appropriate to undertake this study based on the contributions of Dr. S.R. Ranganathan. Using an intermediary software to extract data from GS for performing bibliometric analysis also reflects a unique methodology.

Study Objectives:

The aim of the study is to investigate descriptive quantitative analysis of the scholar profile of Dr. S.R. Ranganathan since its inception until today.

This study aims to perform Bibliometric analysis on the most prominent personality in the LIS field Dr. S.R. Ranganathan. Bibliometric analysis is the statistical evaluation of published scientific articles, books or book chapters, and is an effective method to measure the impact of publications on the scientific community. The academic impact of a piece of research can be gauged by the number of times it has been cited by other authors (Iftikhar et al.).

Data Source:

The origin of bibliographic data pertaining to all of the published work of Dr. Ranganathan was Google Scholar (GS). It is a bibliometrics database that aims to categorize documents in the same way as researchers, weighing the full text of each document, the publication location, author, and the frequency and recent time cited in other academic literature. It provides an easy way to search a wide variety of academic literature. From one place, you can search many disciplines and sources: articles, papers, books, abstracts, and court opinions from academic publishers, professional associations, online knowledge bases, universities, and other websites. Google Scholar aims to classify documents as researchers, weighing the full text of each document, the location of the publication, the author, and the frequency and timing of citations in other academic literature.

Google Scholar: Google Scholar (GS) is a free web search engine that indexes the full text or metadata of scholarly literature from a wide range of publishing formats and disciplines. Google Scholar indexes the vast majority of peer-reviewed online journals, scholarly books, and other non-peer-reviewed journals. Users can use Google Scholar to look for digital or physical copies of articles, whether they are online or in libraries. Google Scholar's "cited by" feature provides access to abstracts of articles that have cited the article being viewed. This feature provides citation indexing, which was previously only available in Scopus and Web of Knowledge. GS has emerged as a competitor to the well-

known citation databases, Web of Science and Scopus. Despite its many limitations, researchers are interested in the GS's free availability and extensive coverage for evaluative studies (Patra 2014).

Prof. S. R. Ranganathan founded the Documentation Research and Training Centre (DRTC) in 1962. It is an internationally recognized Centre for advanced training and research in Library and Information Science. The DRTC is a branch of the Indian Statistical Institute's Bangalore Centre. This Organization also made an effort to amalgamate Ranganathan's 307 writings under a GS profile. An attempt was made, based on that GS profile, to analyse the amount of literature contributed by Sir. Ranganathan. Based on GS, this study attempted to trace the citation and authorship patterns of Sir Ranganathan's papers. In this study, an attempt was made to analyse and interpret data collected from Ranganathan's research publications as reflected in GS. The analysis includes the distribution of publications by year, the authorship pattern, collaboration for publication, and journal preferences for publication.

Google Scholar profiles provide authors with an easy way to display their academic publications. You can see who is citing your article, draw citation charts over time, and calculate various citation metrics. You can also make your profile public so that it will appear in Google Scholar results when people search for your name. ("Google Scholar Profiles")

It is observed that the data from Google Scholar cannot be used in the VoS viewer. This study is an experiment using Publish or Perish proxy software to run GS data in the VoS viewer.

Data Extraction Tool:

The relevant bibliographic data from Google Scholar Publish was extracted with the help of Publish or Perish (PoP). PoP, developed by Harzing, A.W. (2007), a free software program for querying and retrieving search results from a variety of academic databases including Scopus, Web of Science, GS, etc PoP retrieves original citations, then analyses them to provide the following research metrics:

- Total number of papers and total number of citations
- Average citations per paper, citations per author, papers per author, and citations per year
- Hirsch's h-index and related parameters
- Egghe's g-index
- The contemporary h-index
- Three variations of individual h-indices
- The average annual increase in the individual h-index
- The age-weighted citation rate
- An analysis of the number of authors per paper.

Data Analysis:

For building and visualizing bibliometric networks, VoSviewer software was used. These networks may include individual journals, researchers, or publications, and may be built on the basis of citations, bibliographic coupling, co-

citation, or co-authorship relationships. VOS viewer also provides text mining functions, which can be used to build and visualize co-occurrence networks of important terms extracted from the scientific literature. (*VOSviewer - Visualizing scientific landscapes*, n.d.). The overall process of data extraction, preparation, processing and visual analytics can be represented diagrammatically as under:

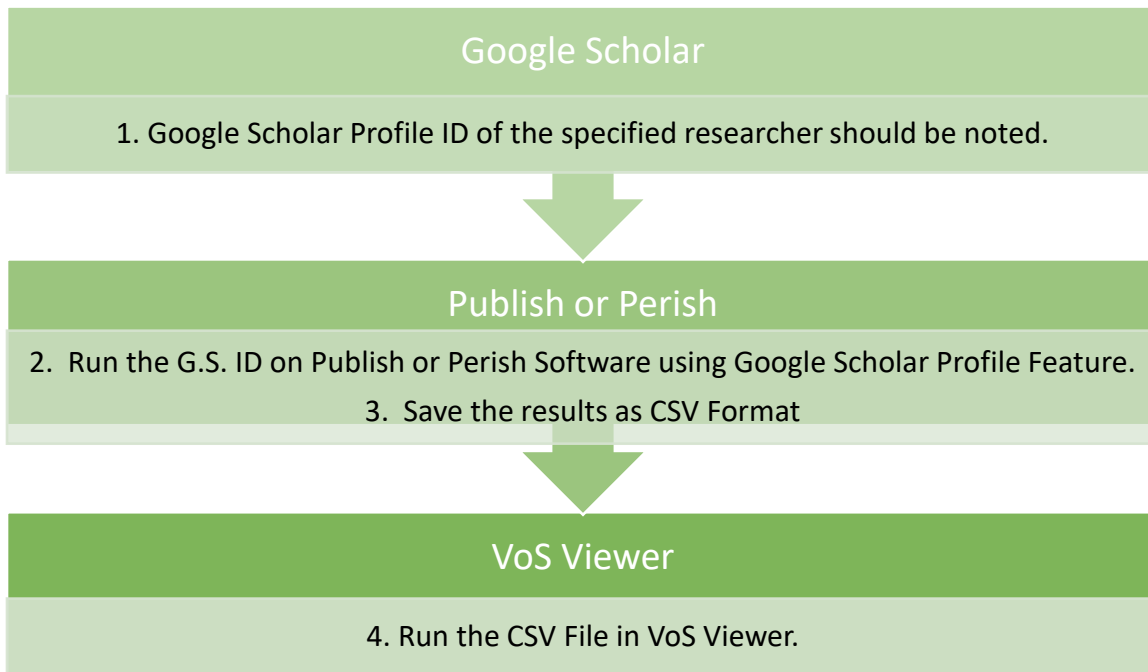


Figure 1: Process of data extraction, preparation, processing and visual analytics

STEP 1: Google Scholar ID

Google Scholar ID

scholar.google.co.id/citations?hl=en&user=r=T1TgnlAAAAJ

Shiyali Ramamrita Ranganathan
 University of Madaras; University College London; BHU; University of Delhi; DRTC, Bengaluru
 Verified email at jgu.edu.in - [Homepage](#)
 Library Science Documentation Information Science

Cited by [VIEW ALL](#)

	All	Since 2016
Citations	5477	1335
h-index	27	15
i10-index	55	18

TITLE	CITED BY	YEAR
The five laws of library science SR Ranganathan Madras Library Association (Madras, India) and Edward Goldston (London, UK)	1205	1931
Prolegomena to library classification SR Ranganathan Madras Library Association, Madras	1160	1937
Colon classification SR Ranganathan Madras Library Association, Madras	502	1939
Elements of library classification SR Ranganathan	255	1892

Bar chart showing citation trends from 2014 to 2021. The Y-axis represents the number of citations, ranging from 0 to 320. The X-axis represents the years from 2014 to 2021. The chart shows a general upward trend in citations, with a peak in 2017 and a slight decline in 2021.

Figure 2: Google Scholar ID

The Google Scholar ID is the unique ID of every Google scholar profile. The unique ID is available in the URL of the researcher. Figure 2 represents the GS profile of the father of Indian library science (S.R. Ranganathan). Here is the screen grabbing of the GS ID (T1TgnaIAAAAJ) of Ranganathan. However, DRTC played the background role. Furthermore, Figure 2 also has the representation of citations and index counts. This investigation was initiated primarily at the stage of obtaining Ranganathan's GS ID.

STEP 2: Using Publish or Perish (PoP)

- a. Open the POP Software and click on Google Scholar Profile.

The screenshot shows the Harzing's Publish or Perish (Windows GUI Edition) 7.33.3388.7819 interface. The main window displays a search for 'Shiyali Ramamrita Ranganathan' on Google Scholar. The search results table is as follows:

Search terms	Source	Papers	Cites	Cites/year	h	g	hI,norm	hI,annual	hA	acc10	Search date	Cache date	Last ...
Shiyali Ramamrita Ranganathan...	Google Sch...	307	5455	42.29	27	72	27	0.21	5	3	08/19/2021	08/19/2021	0

Below the search results, there is a section for selecting an existing search to inspect or modify it, or click one of these buttons to create a new search. The buttons include:

- Crossref**
- Microsoft Academic**
- Import External Data...
- Google Scholar* (highlighted with a blue box)
- Scopus**
- About importing external data
- Google Scholar Profile*
- Web of Science***
- PubMed*

Legend:

- * Free data source
- ** Free registration required
- *** External subscription required

The Results section on the left includes a 'Help' link and a list of metrics: Publication years, Citation years, Papers, Citations, Cites/year, Cites/paper, Authors/paper, h-index, g-index, hI,norm, hI,annual, hA-index, and Papers with ACC >= 1,2,5,10,20.

Figure 3: Google Scholar Profile

Publish or Perish provides various options to collect different types of scientometrics numerology on authors. The author's visibility under GS, Web of Science, Crossref, PubMed, Microsoft Academic, and Scopus databases can be checked by using this software. This research had the motive of evaluating the GS data of Ranganathan. Ergo, the 'Google Scholar Profile' tab was used to place the GS ID. Figure 3 exhibits the overall scenario of this stage of research.

b. Enter the profile ID and Run Search

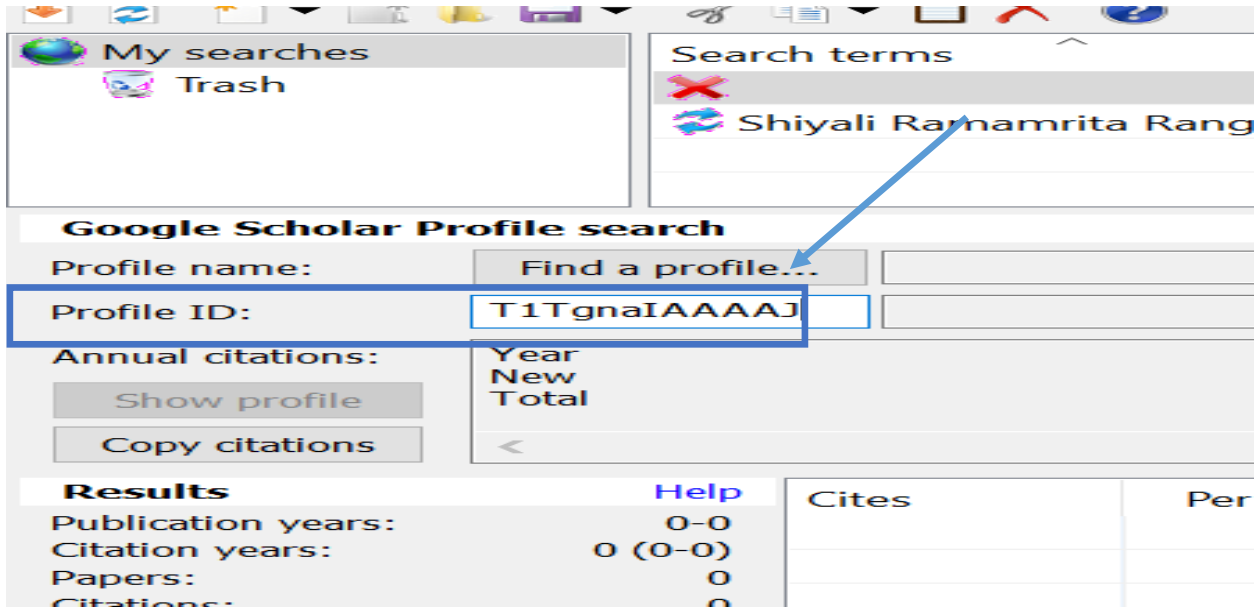


Figure 4: Profile ID

Figure 4. displays the actual depiction of fundamental steps prior to gathering the author's GS data using PoP. All manual work for gathering numerical data from PoP will be managed to be completed once this stage is finished.

c. Click on Search and the process of searching for all the articles on GS Profile will start on POP.

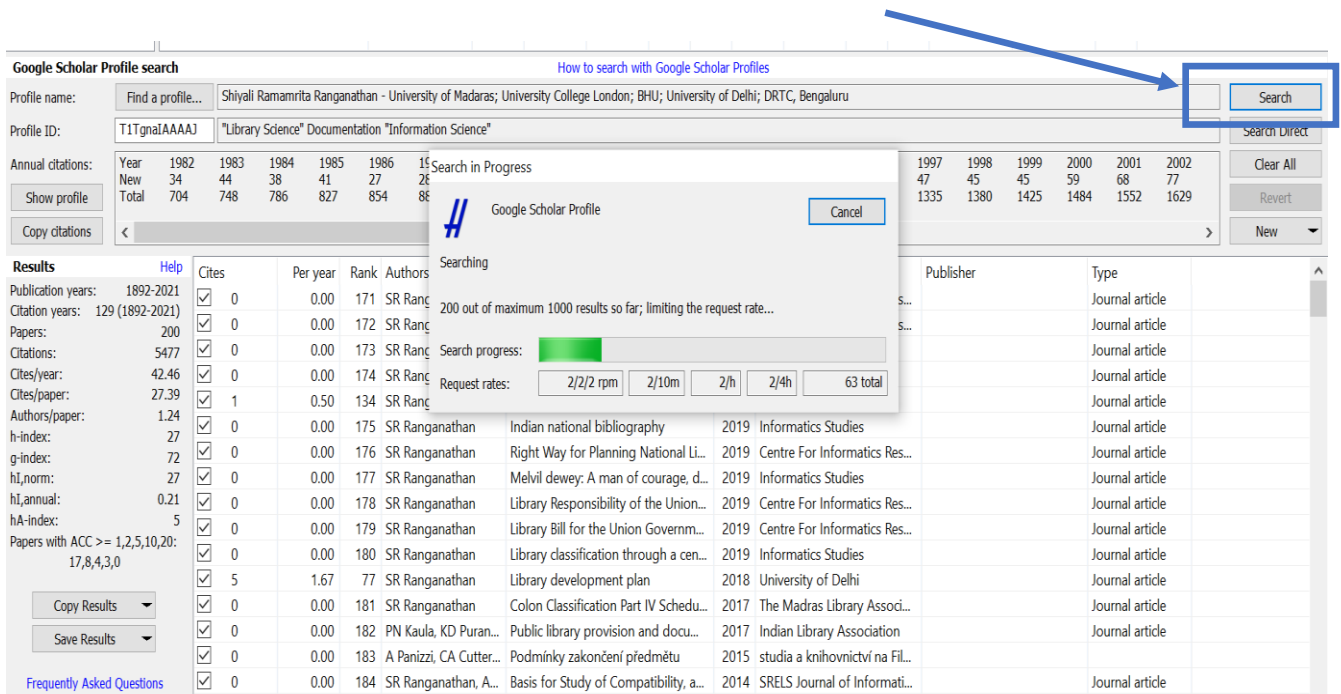


Figure 5: Process of searching articles

This stage visualises GS data over PoP. Figure 5 upholds the search button under the blue rectangular box further. By clicking this button, PoP starts cloning data from the GS database based on the GS ID mentioned over here. Whereas PoP can't retrieve more than a thousand documents from a GS profile. While "Publish or Perish" does not limit the number of results individuals will receive. The original data source imposes the restrictions. Crossref, for example, limits the number of articles that can be drawn by PoP to 200, whereas Google Scholar limits the number of documents to 1000. Furthermore, Microsoft Academic allows for 5000 articles, PubMed allows for 1000 articles, Scopus allows for 200 articles, and Web of Science allows for 200 documents. Remember, Publish or Perish is just a front-end to these data sources.

d. Save the Results in RIS Format

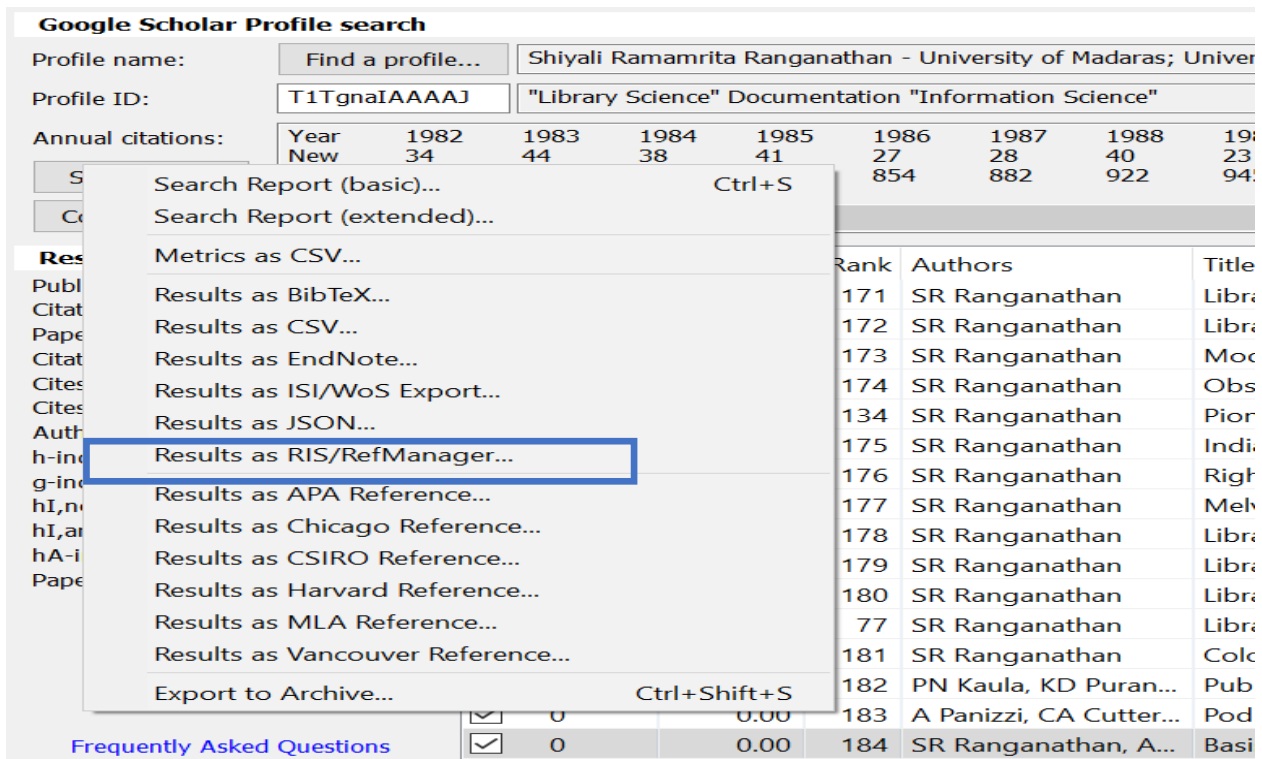


Figure 6: Save result as RIS File

PoP settled his own assignment at this stage. Figure 6 evince the exportation process of the RIS/ Ref Manager file from PoP. While VoSViewer can process different file formats, based on PoP's limitation in file format for result, .ris is the only readable file in VoSViewer. After providing the.ris file to VoSViewer, PoP accomplished its own mission in this research.

STEP 3: Run the saved results on VoSViewer for data visualization and analysis.

This step included a forerunner walkthrough for visualising Ranganathan's publication matrices using VoSViewer. Following the completion of step 3, all numerical data was collected and analysed. This step is referred to as the rearmost in the sequence.

Results and Discussion:

To perform the study Google Scholar profile of Dr. S. R. Ranganathan was extracted using Publish or Perish (PoP) software. The results are available on screen and can also be copied to the Windows clipboard (to be pasted into other applications) or saved in various output formats (for reference or future analysis). Publish or Perish includes a detailed help file with search tips and additional information on citation metrics.

After retrieving the data from Publish or Perish, data was then analyzed using Bibliometrics software VoS Viewer.

➤ Authors Collaboration pattern:

Sr. No	Publications	I	II	III	IV	VII	XIII	XIV	Total
1.	Single Authored	241							241
2.	Two Authored	41	10						51
3.	Three Authored	8		1					9
4.	Five Authored	1		1					2
5.	Nine Authored		1						1
6.	Fifteen Authored					1			1
7.	Twenty Authored						1		1
8.	Twenty One Authored							1	1

Table I: 1st author; II: 2nd author; III: 3rd author; IV: 4th author; VII: 7th author; XIII: 13th author; XIV: 14th author.

The academic community holds the view that authorship status is determined by the quantity of contribution made by the author. Table 1 shows the authorship status of Dr. S.R. Ranganathan's work among the core collaborators. As observed from the table, a total of 241 documents are single authored. 51 documents have two authors out of which 41 documents have Dr. S.R. Ranganathan as the first author. 9 documents have 3 authors with 8 as first author while 1 as the third author. 2 documents have 5 authors with 1 document as 1st author and 1 document as 3rd author. Further documents with 9, 15, 20 & 21 authors were also observed with Dr. S.R. Ranganathan as 2nd, 7th, 13th & 14th author respectively. Study of the above table revealed the authorship pattern of the documents published by Dr. S.R. Ranganathan. The table thereby signifies Dr. S.R. Ranganathan's contribution in collaborative works.

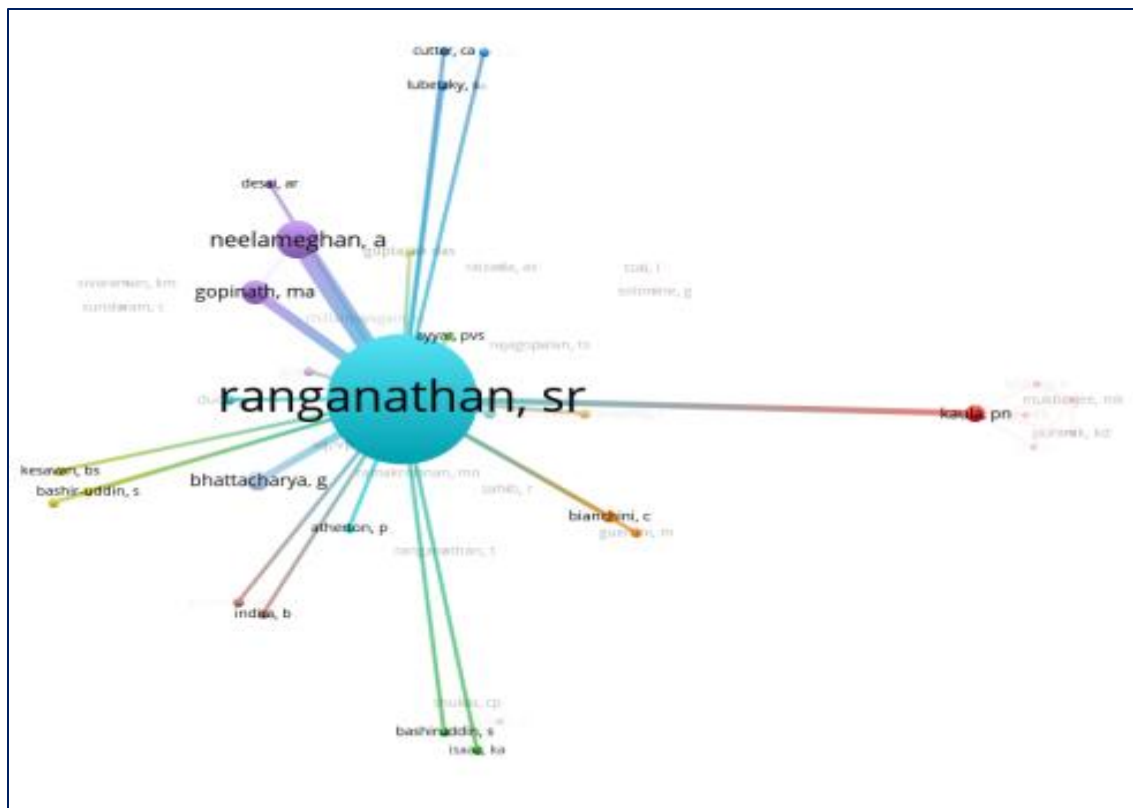


Figure 7: Author Collaboration Network

The link, collaboration or network between the authors is shown with the help of visualization map from VOSviewer. From a total of 52 authors, 52 met the threshold by considering the author having at least 1 numbers of documents. Out of 52, only 44 authors showed connections to each other. As highlighted in figure.7 the network contains 44 nodes, 74 co-authorship links and 23 clusters. Each node in the figure represents an author's productivity and the links between the authors denote the collaboration established through the co-authorship in the articles. The total link strength is 120. It has been observed from the network map that Dr. S.R Ranganathan had very strong collaboration with Neelameghan, A and Gopinath, M A. The other top contributing authors included were Bhattacharya, G, Kaula, P.N, Billings, J.S, Brown J.D, Kesavan, B.S, Cutter, C.A and so on. Some of the works of Dr. Ranganathan with these collaborators are: Classified Catalogue Code: With Additional Rules for Dictionary Catalogue Code (1958) by Book by S. R. Ranganathan and A. Neelameghan. Colon classification by SR Ranganathan and MA Gopinath (1989). Library Book Selection: (edition 2) (Ranganathan Series in Library Science) by S. R. Ranganathan and M. A. Gopinath (Contributor).

Co-occurrence map based on Text Data

The maps presented in Figure 8, shows the most frequently used terms in the titles of the publications related to Dr. S. R Ranganathan. The figure showed two major clusters, one in green color, and one in red color. Green cluster contained terms related to library classification and Cataloguing codes.

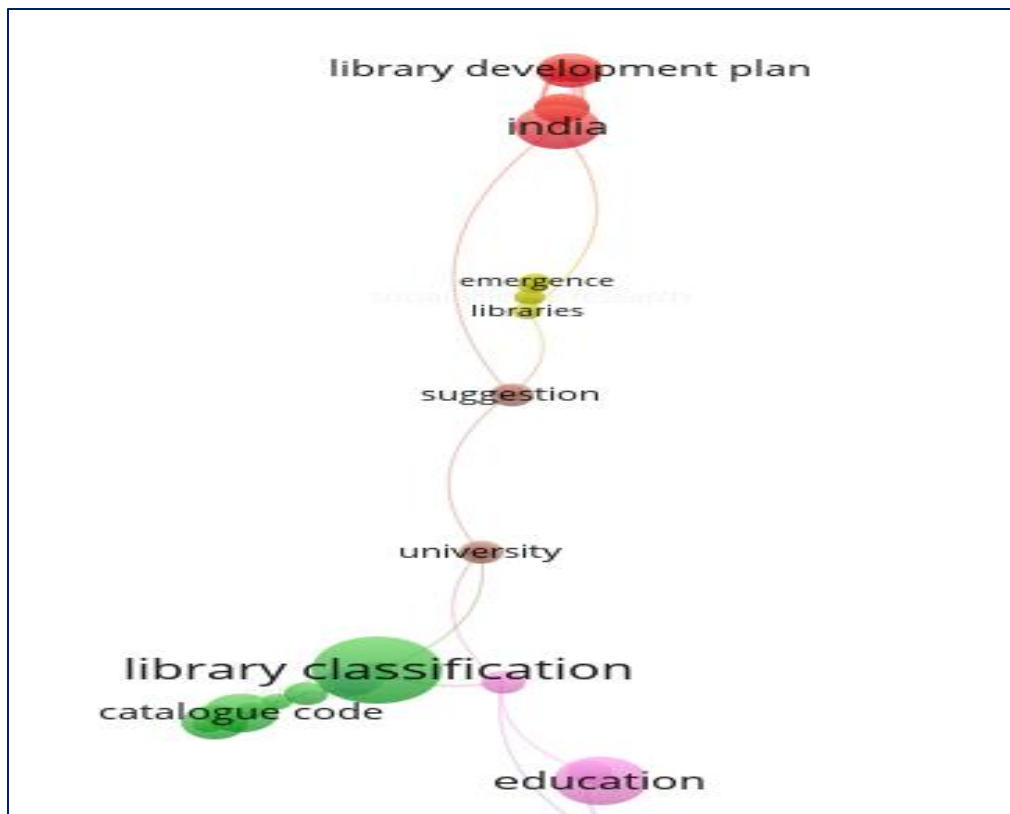


Figure 8: Co-occurrence map based on Text Data

These terms are the key concepts in the area of Library & Information science and red cluster contained terms related to Library development plans in India and library legislation in India (as credit goes to Dr. S. R. for his contribution in Indian Library legislation movement). From his works or publications in the research area of LIS it can be observed that he was the expert or founder of these concepts in India. His works included : The Five Laws of Library Science (1931), Colon Classification (1933), Classified Cataloguing Code (1934), Prolegomena to Library Classification (1937) and Classification and Communication (1951) and so on.

Metrics retrieved from POP:

Reference date: 2021-09-18 10:02:27 +0530

Publication years: 1892-2021

Citation years: 129 (1892-2021)

Papers: 307

Citations: 5502

Citations/year: 42.65 (acc1=17, acc2=8, acc5=4, acc10=3, acc20=0)

Citations/paper: 17.92

Authors/paper: 1.33/1.0/1 (mean/median/mode)

Age-weighted citation rate: 100.26 (sqrt=10.01), 95.84/author

Hirsch h-index: 27 (a=7.55, m=0.21, 4707 cites=85.6% coverage)

Egghe g-index: 72 (g/h=2.67, 5264 cites=95.7% coverage)

PoPhI,norm: 27

PoPhI,annual: 0.21

FassinA-index: 5

Year	New	Total citations
1982	34	709
1983	44	753
1984	38	791
1985	41	832
1986	27	859
1987	28	887
1988	40	927
1989	23	950
1990	39	989
1991	34	1023
1992	77	1100
1993	39	1139
1994	33	1172
1995	65	1237
1996	56	1293
1997	47	1340
1998	45	1385
1999	45	1430
2000	59	1489
2001	68	1557
2002	77	1634
2003	104	1738
2004	133	1871
2005	100	1971
2006	146	2117
2007	131	2248
2008	170	2418
2009	207	2625
2010	227	2852
2011	207	3059
2012	259	3318
2013	295	3613
2014	277	3890
2015	261	4151
2016	249	4400
2017	306	4706
2018	206	4912
2019	248	5160
2020	219	5379
2021	123	5502

Table 2. Total number of publications with citations**Top 10 Cited publications by S R Ranganathan**

Title	Year	Cites	Cites/Year	ECC	Age
The five laws of library science	1931	1213	13.48	1213	90
Prolegomena to library classification	1937	1163	13.85	1163	84
Colon classification	1939	502	6.12	502	82
Elements of library classification	1892	255	1.98	255	129
As cinco leis dabiblioteconomia	2009	185	15.42	185	12
Reference service	1961	163	2.72	163	60
Philosophy of library classification	1989	131	4.09	131	32
Colon classification	1989	109	3.41	109	32
Documentation and Its Facets: Being a Symposium of 70 Papers by 32 Authors. Edited by SR Ranganathan	1963	87	1.5	87	58
Colon classification	1963	85	1.47	85	58

Table 3.Cited publications by S R Ranganathan**Top 20 publications Metrics based on GS Rank Algorithm**

GSRank	Year	Cites	CitesPerYear	ECC	CitesPerAuthor	AuthorCount	Age
1	1931	1213	13.48	1213	1213	1	90
2	1937	1163	13.85	1163	1163	1	84
3	1939	502	6.12	502	502	1	82
4	1892	255	1.98	255	255	1	129
5	2009	185	15.42	185	185	1	12
6	1961	163	2.72	163	163	1	60
7	1989	131	4.09	131	131	1	32
8	1989	109	3.41	109	55	2	32
9	1963	87	1.5	87	87	1	58
10	1963	85	1.47	85	85	1	58
11	2004	81	4.76	81	81	1	17
12	1934	77	0.89	77	77	1	87
13	1951	76	1.09	76	76	1	70
14	1969	68	1.31	68	68	1	52
15	1935	61	0.71	61	61	1	86
16	1990	59	1.9	59	59	1	31
17	1966	51	0.93	51	51	1	55
18	1967	48	0.89	48	48	1	54
19	1971	36	0.72	36	36	1	50

20	1964	36	0.63	36	36	1	57
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Table 4. Publications Metrics based on GS Rank Algorithm

Citations Received Per Year

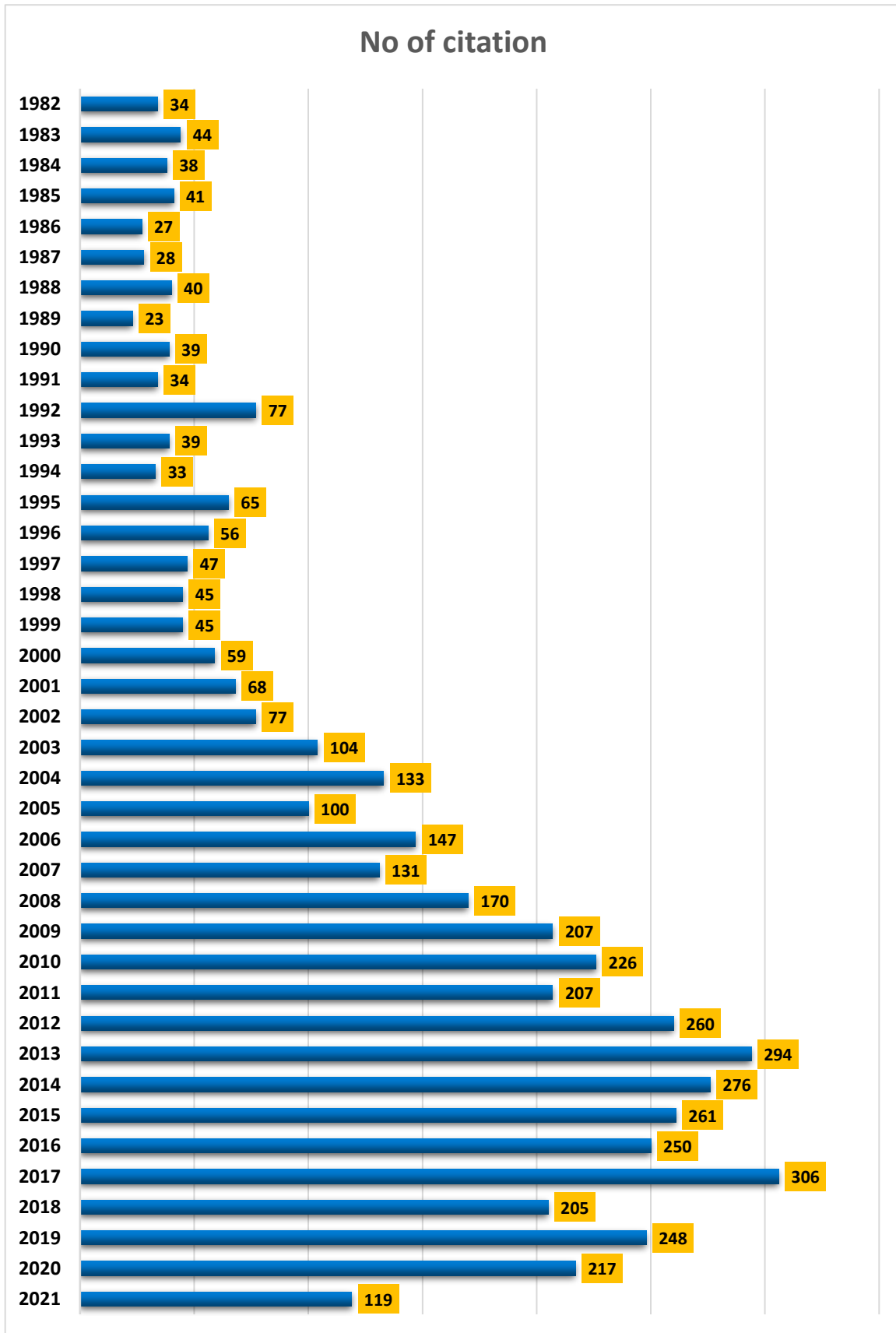


Figure 9: Citations Received Per Year

Figure 9 above represents the pattern of total citations received per year since 1982-till present. It can be observed from the figure that even after many years of publications his articles continue to receive citations. Highest citations (306) were received in the year 2017, followed by the year 2013 (294) and 2014 (276).

Conclusion:

Ranganathan left his constantly visible footprint in the world of library science. The world's only pioneering scholar from a developing country who has contributed to the theories and practises of library and information studies named Ranganathan. He was the only LIS theorist from the Global South whose work has consistently piqued the interest of next-generation scholars all over the world. The current study discovered that some professors and library professionals are now introducing Ranganathan as an author in their publications to analyse and evaluate Ranganathan's concepts. This research had no intension to judge the productivity level of Ranganathan's publications however it is possible to judge such a renowned legend based on the numerical values of bio-bibliometrics. It was an attempt to portray Ranganathan's bio-bibliometrics numerals and authorship patterns, using pictorial figures and tabulations.

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