Library and Information Sciences Research in A Global University: A Bibliometric and Altmetric Analysis

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Abstract

The objective of this study is to examine the research output in the field of library and information science (LIS) from universities worldwide over the past 10 years (2013–2023). This is achieved by conducting a comprehensive bibliometric and altmetric analysis based on data from the Scopus database and using Bibliometrix-R software. The findings highlight the trends in published works in LIS, and information on authors, subject areas, journals, countries, funding sources, and collaboration among LIS researchers at global universities. The university with the highest research output in the field of LIS is found to be Wuhan University. Meanwhile, the frequency of author's keywords such as 'information science,' 'library and information science,' 'bibliometrics,' 'academic libraries,' and 'citation analysis' are among the topics frequently associated with this research field. This study also highlights the most frequently used keywords by authors, and Altmetric.com is employed to showcase the scores indicating the prevalence of research articles on various social media platforms. Our bibliometric analysis aims to provide insights into the trends and context of publishing and citation practices; a crucial aspect is support for collaborative citation practices, which is needed to strengthen and foster cooperation in disseminating research output in LIS at universities. Lastly, we analyze the altmetric attention score as a novel metric for gauging the emerging impact in terms of discussion in social media, which deserves attention in future research endeavors in LIS and other related disciplines.

Keywords: Library and Information Sciences, University, Global, Bibliometrics, Altmetric analysis.

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1. Introduction

Universities play a crucial role in the sustainable development of a country through their three key functions and missions, namely teaching, research, and service to society or industry, all of which are vital components for all universities worldwide. (Compagnucci & Spigarelli, 2020; Makki et al., 2023) All of these elements are integral to enhancing the quality of universities and building the reputation of a university, which in turn contribute to the success of students, communities, societies, and nations. Universities worldwide are also increasingly concerned with evaluation and global ranking systems as part of their sustainable development efforts. The annual publication of university rankings has significant implications for competition among universities (Sibal, 2011; Guo et al., 2023). One crucial aspect of university research is the accurate counting and evaluation of the research potential of scholars affiliated with the university. This is done to measure the level of proficiency in terms of disseminating published works and utilizing research findings for citation purposes, as a reputable profile can be established for both researchers and the university through the measurement of research impact (Matveeva et al., 2021). Principles that can be employed to measure and analyze the impact of research within a university include the evaluation of research outputs published and disseminated in various large-scale databases, such as Scopus, Web of Sciences, PubMed, and ProQuest, among others. The technique of bibliometric analysis has become another crucial tool that has been widely used across various disciplines for some time.

Bibliometric indicators serve as valuable metrics for assessing the quality of research (Middleton, 2005; Joshi, 2015) and university rankings (Szluka et al., 2024), and for analyzing and evaluating curricula (Juznic & Urbanija, 2003; Kreijkes, 2022). In a bibliometric analysis, quantitative and statistical methods are employed to describe the relationships among authors, article titles, academic works, citation patterns, or various impact metrics (Agarwal et al., 2016; Merigó, 2016). Studies in the field of LIS began in the 1960s (Galvin, 1977; Golub & Hansson, 2017), and research in this area is an interdisciplinary blend, incorporating various strategies and techniques. A diverse range of study topics and activities are encompassed within this research domain (Powell et al., 2002; Togia & Malliari, 2017; Hsiao & Chen, 2020), as it is a discipline that involves the creation of data, management of information, utilization of information in various forms, communication, data storage, maintenance or preservation of information, and dissemination of information sources (Sweeney & Estabrook, 2018).

Currently, research in LIS is undergoing consistent growth and has gained significant amounts of attention, driven by the ever-evolving technology landscape and the continuous increase in volumes of big data. This study is conducted from an impact measurement perspective, and both a bibliometric analysis and altmetric analysis (based on the altmetric attention score, AAS) are carried out to assess the impact of research works. We take into consideration literature citations and the dissemination of information via social media, utilizing academic standards and gauging responses from the scholarly community. The AAS is an important metric that enables a wide-ranging understanding and assessment of the quality of research across various disciplines, especially in information sciences (Maflahi & Thelwall, 2016). There has recently been growing interest among scientists in analyzing altmetrics. Altmetric (https://www.altmetric.com) is a company under the Macmillan umbrella, with a primary focus on leveraging technology to support scientific research. This serves as one avenue for analysis, which allows us to measure the impact in terms of social media, as it tracks and quantifies the overall mentions for each research output, and is designed as an indicator of the level of awareness or interest the research has garnered. The results reflect the impact associated with different sources, in terms of both the scholarly and societal impacts of the research through dissemination on social media, such as comments on blogs, mentions and posts on platforms such as Facebook and X, and online reference managers such as Mendeley (Rahimi et al., 2019; Robinson et al., 2021).

Research integrating bibliometric analysis with the Altmetric Attention Score (AAS) has gained increasing attention across various disciplines. For instance, Mokhtari et al. (2020) conducted a bibliometric analysis combined with an altmetric study in the Anatolia journal, an international journal of tourism and hospitality research, while similar approaches have been applied in various health-related topics (Patil et al., 2023; Karabay et al., 2024; Rostami et al., 2024), including research on the ketogenic diet (Yusufoglu et al., 2023). Despite this growing trend, studies incorporating both bibliometric and altmetric analyses in the field of Library and Information Science (LIS) remain limited. To address this gap, this study examines LIS research output from university-level institutions worldwide over the past decade (2013–2023) using bibliometric and altmetric approaches. Specifically, it investigates trends in LIS publications, key authors, subject areas, top journals, leading countries and institutions, and collaboration networks. Furthermore, the study explores the AAS of highly cited LIS articles to assess their social media engagement and broader impact. Since citation data alone may not fully reflect the quality of a research output (Karabay et al., 2024), an altmetric approach is employed to capture the extent of research dissemination beyond traditional citation metrics. By leveraging social mentions and alternative impact indicators, this study aims to provide a multidimensional perspective on LIS research, ensuring that the dissemination and engagement of scholarly work extend beyond conventional bibliometric assessments to a global readership. We aim to analyze research articles in the area of LIS published in journals between 2013 and 2023 from university-level institutions, utilizing bibliometric and AAS analyses.

2. Methodology

2.1 Data Collection and Data Processing

The study conducted a comprehensive analysis of global Library and Information Science (LIS) research literature available in the Scopus database for the period between 2013 and 2023, with data

retrieved on January 15, 2024. The search strategy was designed based on the definitions provided by Hjørland (2018a, 2018b), utilizing the search query: TITLE-ABS-KEY ("library and information science" OR "library science" OR "information science*") AND AFFIL (universit*)**. To ensure data relevance, general terms unrelated to the analysis, such as "article," "human," "male," "female," "child," etc., were excluded. This resulted in a final dataset comprising 6,868 research articles, which were exported in CSV format for further bibliometric and altmetric analysis. To enhance the transparency and rigor of the research process, the study followed the PRISMA model (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) (Moher et al., 2009) as a systematic framework for data collection and refinement. The PRISMA flowchart (Figure 1) provides a structured overview of the inclusion and exclusion criteria, data retrieval, and filtering process, consisting of the following key stages:

1. Identification – An initial search was conducted in Scopus using predefined keywords.
2. Screening – Duplicate and irrelevant records were removed.
3. Eligibility – Inclusion criteria were applied, focusing on journal articles, university-affiliated research, and LIS-focused studies.
4. Inclusion – A final selection of 6,868 research articles was made for analysis. This structured approach ensures the reliability and reproducibility of the dataset while providing a clear methodological foundation for subsequent bibliometric and altmetric assessments.

2.2 Analyzing Results

Bibliometric Analysis: Bibliometric analysis was conducted using the Bibliometrix-R package (version 4.2.3). Key indicators such as publication trends, citation impact, and collaboration networks were analyzed. The study identified top authors, institutions, journals, and funding sources contributing to LIS research.

Altmetric Attention Score (AAS): was calculated using data from Altmetric.com. The AAS aggregates mentions from various sources, including social media (Twitter/X, Facebook), news outlets, blogs, and policy documents. The study examined the AAS of the top 10 cited LIS articles to evaluate their broader impact. The data extraction process followed these steps:

1. Identifying the DOI of each article in the top 10 most-cited list.
2. Retrieving AAS data from Altmetric.com.
3. Categorizing the sources of altmetric mentions (social media, news, policy, etc.).
4. Comparing AAS with citation counts to assess engagement trends.

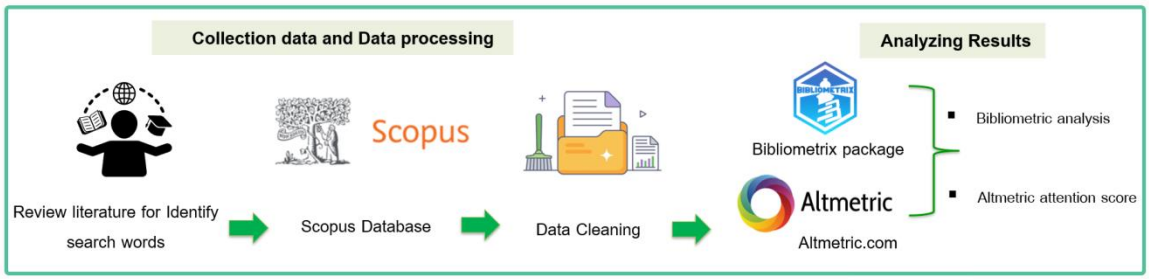
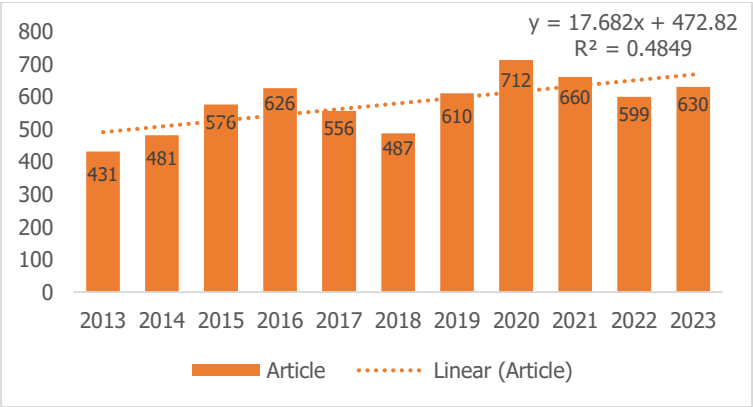


Figure 1 Procedure used for bibliometric and altmetric attention score analyses

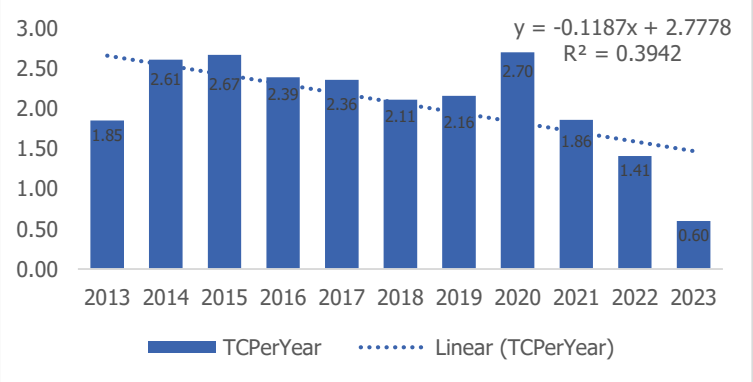
3. Results

3.1 Research Output and Citations

Figure 2A shows the frequency distribution of articles published in global LIS journals in English from universities worldwide. The total count was 6,863 articles, and a significant increasing trend was seen in the numbers of articles over the years 2013 to 2023 ($R^2 = 0.4849$). Figure 2B depicts the frequency distribution of the average citation values per year, and a gradual decrease in citations over time can be seen for all received citations ($R^2 = 0.3942$). However, an exception is observed in 2020, where the highest publication count and the highest average citation value are seen.



(A)



(B)

Figure 2 (A) Frequency distribution of articles; (B) Total numbers of citations per year, for the period 2013–2023

3.2 Journals

Table 1 shows that the top journal in terms of publishing research output in LIS was *Information and Management*, with a high H-index of 52, followed by *Scientometrics* and the *Journal of Chemical Information and Modeling* with H-indexes of 31 and 24, respectively. The overall total citation count shows that these quality journals range between 1,000 to 2,000 citations for journals ranked 3-10. Significant increases in citations are observed over time, particularly for the *Scientometrics* journal, which holds the second position, and a positive relationship in citations was found for the *Information and Management* journal. This suggests that *Information and Management* is the most highly cited journal. We also note that the journals in the top 10 rankings began publishing from the year 2013, followed by 2014, 2015, and 2017. Overall, all of the top 10 journals can be classified as Q1 in terms of their quality.

Table 1 Top 10 most active journals

Rank	Journals	h_index	g_index	m_index	TC	NP	PY_start	Q
1	Information and Management	52	90	4.333	9,433	184	2013	Q1
2	Scientometrics	31	65	2.583	4,846	147	2013	Q1
3	Journal of Chemical Information and Modeling	24	39	2.182	1,557	42	2014	Q1
4	Journal of Information Science	24	42	2	2,090	107	2013	Q1
5	Heliyon	23	40	2.875	1,855	81	2017	Q1
6	Journal of Documentation	23	33	1.917	1,925	181	2013	Q1
7	Physical Review Letters	21	34	1.75	1,884	34	2013	Q1

8	Journal of Academic Librarianship	20	29	1.667	1,023	74	2013	Q1
9	Physical Review A	20	29	2	1,070	84	2015	Q1
10	Journal of the Association for Information Science and Technology	19	34	1.727	1,281	50	2014	Q1

NP=Number of publications, TC=Total citations, PY_Start=Publication year start, Q=Journal quartile score

3.3 Content analysis based on subject area

In the Scopus database, subject areas for content analysis are categorized into several disciplines, as shown in Figure 3. It was found that LIS research at the university level mostly fell into the top subject areas of Social Sciences, Computer Sciences, Engineering, Physics and Astronomy, and Arts & Humanities. These are depicted in different colors, and the sizes of the segments in the donut chart for each subject area represent the numbers of LIS research articles from specialized university institutions. Figure 3 highlights the top 10 subject areas with the highest numbers of published LIS research articles.

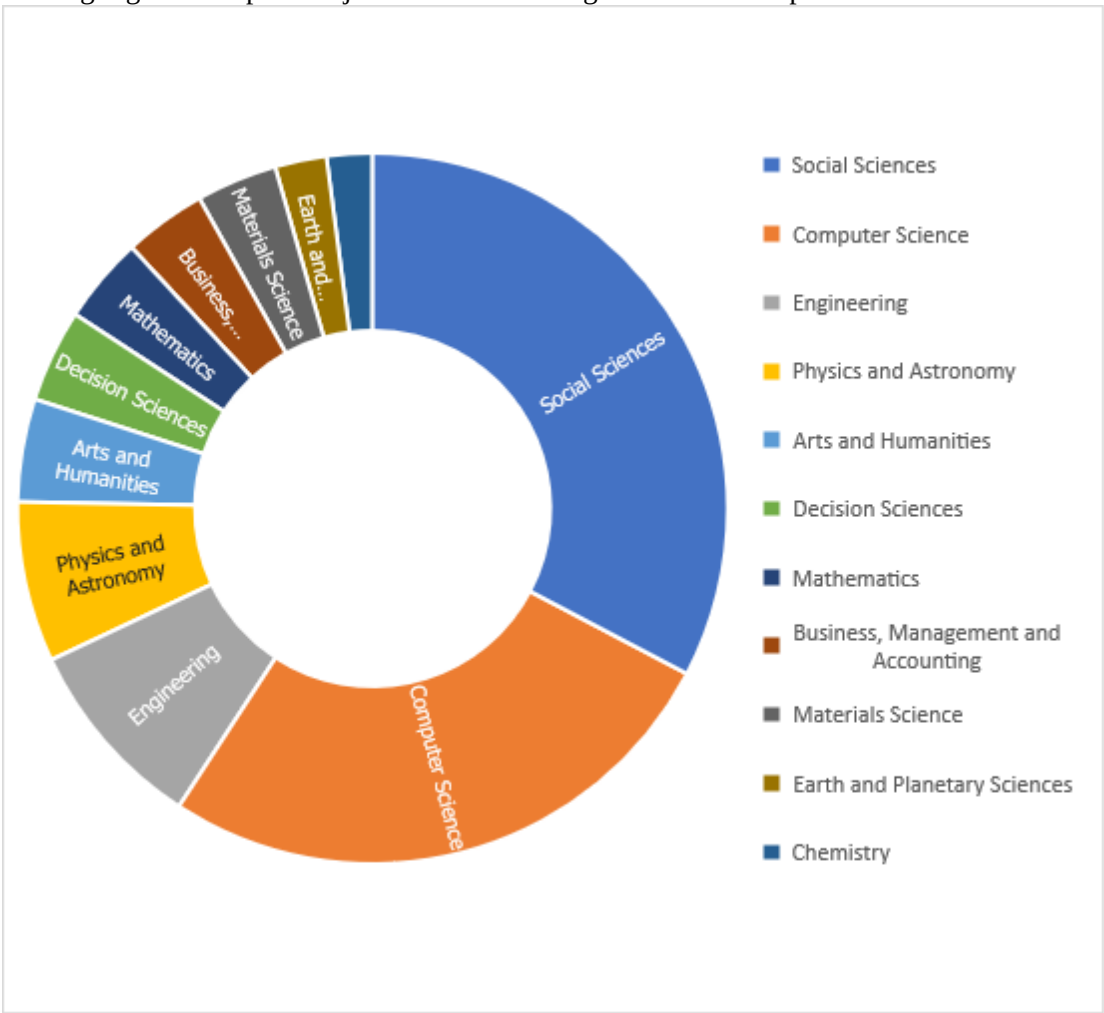


Figure 3 Top 10 subject areas for publications

3.4 Authors, Universities, Countries and Funding Sources

Table 2 shows the top 10 research articles identified from a bibliometric analysis of authors, universities, countries, and funding sources. Wang, Yanfei was identified as the most influential author in terms of publishing LIS research articles. In terms of universities, we observed that Wuhan University was the

leader in LIS research, and was followed by other universities in China in ranks two and three. The countries with the highest research output were the USA, China and India. Finally, in terms of research funding sources, we note that the National Natural Science Foundation of China emerges as the top contributor, with various other countries also contributing to LIS research (Table 2).

Table 2 Top 10 most prolific authors, universities, countries, and funding sources for LIS-related research

Rank	Author(s)	University	Country	Funding source
1	Wang, Yanfei (66)	Wuhan University (244)	USA (1,946)	National Natural Science Foundation of China (628)
2	Li, Juan (49)	Nanjing University of Information Science and Technology (148)	China (1,259)	National Science Foundation (298)
3	Liu, Yiming (49)	Nanjing University (118)	India (435)	Japan Society for the Promotion of Science (116)
4	Li, Yijing (47)	University of California (113)	UK (395)	National Key Research and Development Program of China (102)
5	Zhang, Yin (45)	Northwestern University (103)	Canada (347)	U.S. Department of Energy (92)
6	Wang, Xu (42)	University of Science and Technology of China (85)	Germany (272)	Fundamental Research Funds for the Central Universities (84)
7	Zhang, Xinyuan (38)	Southeast University (81)	Japan (252)	Horizon 2020 Framework Programme (81)
8	Zhang, Jin (36)	National University of Defense Technology (80)	South Korea (239)	European Commission (67)
9	Liu, Jie (31)	Tsinghua University (74)	Australia (214)	National Research Foundation of Korea (55)
10	Zhang, Lijian (31)	University of the Punjab (67)	Iran (206)	Office of Science (53)

3.5 Collaborative University Research

Figure 4 shows the collaboration among LIS researchers at universities worldwide, and reveals three prominent hot spots or clusters: Wuhan University (green), University of California (red), and Nanjing University (blue). The sizes of the circles and the intensity of colors within each cluster represent the extent of collaboration. A total of nine clusters depict the extent of collaboration in research relevant to LIS among various global universities. Wuhan University in China exerts the most significant influence in terms of expanding collaborative LIS research with universities worldwide, as indicated in Table 2. Clear connections can be seen from Figure 4, which affirm that Wuhan University generates the most research articles. We also employed social network analysis statistical principles in our analysis, and the centrality measure was used to assess and highlight the strongest collaboration potential of the top 10 universities, as shown in Table 3. This table reveals the collaborative potential of this group of universities in terms of relationships with researchers contributing to published LIS research over the 10-year period from 2013 to 2023.

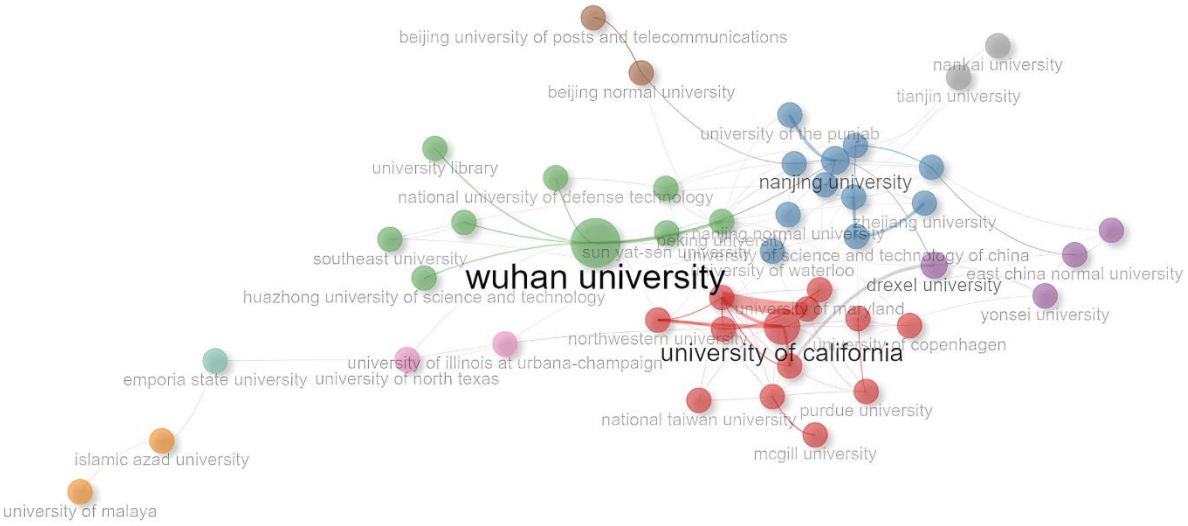


Figure 4 Collaborative research between universities (affiliations)

Table 3 Top 10 collaborative universities, identified through a social network analysis based on centrality measures

Rank	University	Cluster	DC	BC	CC
1	Wuhan University	Green	1.000	302.038	0.012
2	Nanjing University of Information Science and Technology	Blue	0.390	28.364	0.008
3	Nanjing University	Blue	0.486	101.508	0.010
4	University of California	Red	0.674	100.868	0.011
5	Northwestern University	Red	0.280	100.868	0.011
6	University of Science and Technology of China	Blue	0.257	35.219	0.009
7	Southeast University	Green	0.179	5.818	0.008
8	National University of Defense Technology	Green	0.234	1.789	0.008
9	Tsinghua University	Blue	0.312	38.512	0.009
10	University of the Punjab	Blue	0.404	0.000	0.008

DC = Degree centrality, BC = Betweenness centrality, CC = Closeness centrality

3.6 Highly Cited Articles

Table 4 in Appendix I shows all of the top 10 highly cited articles, based on total citations and AAS. An article by Chen and Zhang (2014) emerges as the most highly cited. Meanwhile, from the top 10 most highly cited research articles, the cumulative citation count ascends progressively from 400 to a peak exceeding more than 2,000. The 10th-ranked research article achieved the highest AAS of 172. Most of these research works had the highest AAS for Mendeley, followed by X (Twitter) as the second most prolific platform for sharing research-related information in the LIS field. Other forms of social mentions have also begun to accrue AAS, suggesting the diverse popularity and user interest in sharing academic research information.

3.7 Frequency of Author's Keywords

Figure 5 presents the most frequently used author's keywords in published LIS research articles, ranked from highest to lowest, using a tree map. Our analysis revealed that the term 'information science' was the most commonly used by all authors. The top five keywords in the tree map (i.e., the most frequently used terms) are 'information science,' 'library and information science,' 'bibliometrics,' 'academic libraries,' and 'citation analysis.' This figure shows the results of an analysis of author's keywords during the period 2013 to 2023, using Bibliometrix-R software. The results are visualized using rectangles of varying sizes and colors, which indicate the contribution to the entire dataset and the ranking of the top 20 keywords in the tree map.

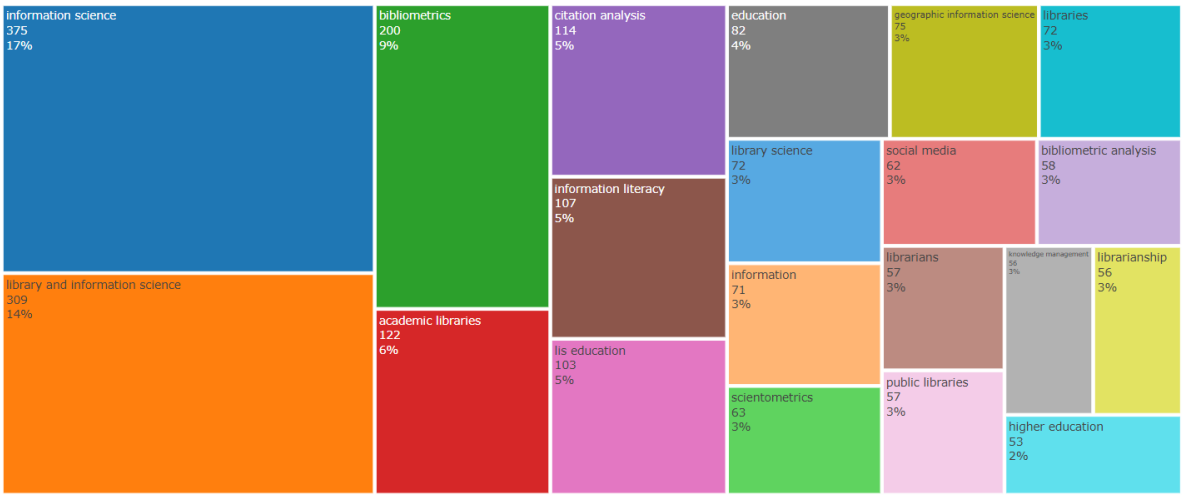


Figure 5 Tree map of the top 20 most frequent author's keywords

4. Discussion

The total number of research articles related to this field was 6,863 over the decade 2013–2023, and we find that research conducted by universities in the USA continues to hold the top position. This finding aligns with research by Panahi et al. (2022), which identified the USA as the leading country in international research collaboration during the period 2011–2021. However, we note that China shows a consistent and strengthening trend in LIS research, and has reached the second position. Furthermore, in terms of the production of LIS research at the university level, Wuhan University emerges as the leading institution, underscoring its potential and readiness to advance LIS research.

From Table 2, which shows sources of research funding, we see that the National Natural Science Foundation of China plays a significant role in supporting research funding for LIS researchers in China. A bibliometric analysis provided an overview of global research organizations and the top 10 research funding sources, emphasizing their crucial contribution to driving research in the field of LIS. Through an altmetric analysis, it was observed that although scientists are increasingly showing interest in altmetric analysis, a combination of bibliometric analysis and altmetric analysis is preferred as a technique that can give good results. This integrated approach is seen as a valuable method for gaining additional insights. We note that studying this aspect shows that articles with the highest citation counts may not necessarily attract attention on social media platforms (Yusufoglu et al., 2023); conversely, some articles with lower citation counts may gain substantial attention on social mentions.

As indicated by the results in Table 4 in the Appendix, when comparing the ranking of the top 10 articles, we see that a paper by Lee et al. (2016) received fewer citations than the other top-ranked articles; however, this study attracted significant attention in terms of research sharing on social mentions, possibly due to its highly interesting content. This was reflected in the AAS, which was 172. In contrast, the top-ranked research article, despite having a total citation (TC) of 2,234, had the lowest AAS of 17. The overall picture of the research in terms of the top 10 articles reveals that Mendeley was the most popular platform for sharing research, perhaps because in addition to enabling searches for research articles and read full texts, it is also a tool for managing bibliographies and reference lists.

Users and readers appear to prefer Mendeley for sharing research works over other platforms. The next most popular platform is X (Twitter), which is well-known in the academic and research community. Readers can show academic interest on this platform through following an X user, thereby promoting the exchange of knowledge and fostering progressive and interconnected academic communities. The platforms listed in Table 4 are beginning to show activity in terms of sharing and building academic communities to create networks among researchers interested in LIS. The least popular platform found in this study was Google+, based on an analysis of AAS.

5. Conclusion

In this study, a preliminary bibliometric analysis of LIS research in university-level institutions was conducted using data from Scopus. AAS scores were utilized to measure the impact of research at the level of online social media engagement, and these scores aided in generating supplementary data for this research study. We carried out a survey of specific and targeted information, and our results will be beneficial to the LIS profession or researchers, with a focus on the collaboration occurring among globally significant universities. Our findings emphasize the strength in generating continuous and enduring publications in LIS, contributing to the rapid growth of the field in various disciplines in the future. Our research results show that the content of articles in this field is predominantly at the intersection of social science and computer science. The citation rates, as evaluated by the results, show a significant decreasing trend.

Researchers at universities should consider the importance of citing works that contribute to and support their research. Strengthening citations can enhance the quality of research, and may lead to higher citation rates, thereby elevating the reputation of their affiliated university. Furthermore, even though the USA leads in terms of generating LIS research articles, significant collaborative relationships and leaps in research output have been made by distinguished institutions such as Wuhan University in China, and these characterize the global landscape.

Research funding institutions also play a crucial role in supporting and promoting LIS research internationally, and have contributed to the remarkable advancements in this field. This study asserts that ongoing support should be provided for research in the field of LIS in the future. This finding is aligned with educational policy directions and the global university landscape that utilizes certain criteria to evaluate the importance of universities. In addition, the increasing popularity of AAS, a novel impact measurement method, means that this could further stimulate awareness and interest in sharing research data through various media, providing another avenue for future exploration.

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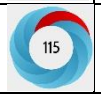
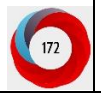
Appendix I.

Table 4 Top 10 highly cited papers.

Rank	Authors/Year	Title	TC	AAS	B	C	F	G	M	N	PA	PO	W	X
1	Philip Chen & Zhang (2014)	Data-intensive applications, challenges, techniques and technologies: A survey on Big Data	2,234		0	1	1	0	3,980	0	2	1	0	7
2	Blaschke et al. (2014)	Geographic object-based image analysis - Towards a new paradigm	1,202		0	0	0	0	1,470	0	5	0	1	9
3	Ellegaard & Wallin (2015)	The bibliometric analysis of scholarly production: How great is the impact?	1,126		2	0	0	0	0	0	0	1	0	2
4	Lex et al. (2014)	UpSet: Visualization of intersecting sets	1,063		4	2	0	0	828	1	1	0	0	22
5	Paré et al. (2015)	Synthesizing information systems knowledge: A typology of literature reviews	940		0	3	0	0	2,438	0	0	4	0	5
6	Pirandola et al. (2020)	Advances in quantum cryptography	757		0	0	1	0	562	1	0	0	5	21
7	Agrawal & Choudhary (2016)	Perspective: Materials informatics and big data: Realization of the fourth paradigm of science in materials science	673		1	1	3	0	1,064	0	0	0	0	46
8	Horodecki & Oppenheim (2013)	Fundamental limitations for quantum and nanoscale thermodynamics	539		3	0	3	5	359	4	0	0	2	7
9	Blais et al. (2021)	Circuit quantum electrodynamics	533		0	0	0	0	1,202	1	0	0	0	167
10	Lee et al. (2016)	Information and communication technology overload and social networking service fatigue: A stress perspective	442		0	0	0	0	806	21	0	0	1	1

TC=Total of Citations, AAS=Altmetric attention score, B=Blogs, C=CiteULike, F=Facebook pages, G=Google+, M=Mendeley, N=New outlets, PA=Patents, PO=Policy source, W=Wikipedia page, X=X users (twitter) (Data retrieved from Altmetric.com on 15 January, 2024)