The Frontiers and Hot Spots of Information Behavior Research at Domestic and Foreign: 2010-2019

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Abstract. Based on the bibliometric and visualization methods, this paper related to information behavior research analyzes 2093 journal papers included in CNKI and WOS in the field of information behavior research, from 2010 to 2019.The hot domains, research fronts and the knowledge base are investigated respectively by means of knowledge mapping generated by visualization software. Conclusions at home and abroad for the past ten years are as flows. Firstly, investigations reveal that user demand, technology, network, retrieval, and medical health information have been the five research hot domains in IBR. Secondly, investigations reveal that medicine, informatics, virtual community of network, semantic information retrieval have been research fronts in IBR. Thirdly, the knowledge base collection of information behavior for the past ten years includes high yield author and representative works which have a significant impact.

Keywords: Information behavior, Comparative Study, Research Fronts, Hot domains, Knowledge map.

1. Introduction

With the advent of the era of big data, the Library and Information Science (LIS) subject is facing new challenges due to the use of technology such as cloud computing, artificial intelligence, block-chain and others. While introducing cutting-edge technology, LIS will bring great opportunities for it.

One of the important research contents in the field of LIS is the analysis and regular discovery of information behavior for the application scene. This study analyzes the situation of information behavior research, and reveals the rise and fall of hot spots at home and abroad in the past 10 years. In order to enable researchers to seize the forefront of scientific research, lead the trend of scientific research, grasp the direction of scientific research, build "China strength" to form a "China voice."

In recent years, foreign countries have focused on the summary of information behavior characteristics based on experiments or the improvement of traditional models. H. C. Wu [1] improves the information-sharing behavior prediction model (ISBP) to help identify the user base, type, and drivers of this behavior. N. Kwon [2] uses the theory of activities as a cultural norm and reference rule to judge the influence of the division of labour among scientists.

Furthermore, foreign information behavior involves the exploration of a variety of disciplines, K. C. Allen[3] in the field of medicine analyzes the impact of information search behavior on the health of socio-economics and during disasters; F. Mohammed[4] adopts comprehensive investigation, qualitative and other strategies, and uses semi-structured interviews, voice thinking and other research methods to analyze the information sharing behavior data to explain the importance of the system environment. J. H. Lee [5] in the field of psychology demonstrates that users prefer comfortable vision, good experience, and appropriate push system design.

Professor Lin Pingzhong[6] opened the door to the study of "information behavior" in China by discussing this research in a relatively formal manner in 1996. The research results of "information behavior" have diversified in recent years. LanXue[7] makes an empirical study on health risk cognition and information search behavior. Many scholars analyze the frontier hot spots in the field of LIS, including the study of information behavior, such as Qiu Junping[8,9] , Zhu Hongyan[10] , Su Fu[11] .DaiJun[12] studies the influence of collaborative information behavior in different environments from the perspective of discipline fusion. Wang Zhijin[13] systematically compared and analyzed the domestic information behavior literature from 1996 to 2017. Zhao Haiping, Deng Shengli[14] analyzes the hot frontiers of information behavior in different situations at home and

abroad according to the meeting, such as ASIS & amp; T 2016, ISIC 2016 and iConference2017. Song Yumei[15] reviews the situation in China in recent years from the perspective of theoretical model, research method and influencing factors. Zhang Weiqun[16] conducts literature research and summary on the information behavior of users in the library field.

2. Data Sources

This study mainly uses literature econometrics to carry out research. Literature econometrics takes mathematics and statistics as the basis of research, takes the quantitative characteristics of literature as the research object, takes the characteristics of literature information as the basis for quantitative analysis and makes predictions, and its characteristic information exploration includes visualization of time and volume, high-yield author analysis, cooperative map analysis of institutions and authors, keyword co-presenting, and keyword clustering. Researchers reveal the changing law of research problems through the law of literature measurement, which is an effective means of evaluating academic achievements [17].

For this purpose, the journal literature on the topic "Information Behavior" of Chinese Core Journal in CNKI and core collection database in Web of Science was selected as the source of sample data. The main search information is shown in Table 1. A total of 2,097 articles were retrieved according to the conditions, and a total of 2,093 articles were selected after processing.

Table 1. Data sources for the Study

Scope	International	China
Database	Web of Science (WOS)	CNKI:CSSCI, CSCD
Retrieving tips	Title: Information behavior	Them: Information behavior
Category of literature	Article	Journal
Time span	2010-2019	
Result	1422	671
Retrieval time	December 4, 2019	December 1, 2019

3. Hot Domains and Research Fronts

3.1 Analysis of Annual Volume

The number of papers published is an important index to study the academic level of a discipline or the scientific research achievements in a certain field. In order to scientifically grasp the current situation and development trend of information behavior, the analysis of the amount of literature in various years at home and abroad is essential. In Figure 1, CNKI's annual volume of essays in 2011 is a dividing line. The number of publications showed a rapid upward trend prior to 2011, indicating that information behavior has attracted the attention of most scholars in China. The volume of submissions was generally stable but decreasing year by year after 2011. During this period, the volume of text sending in the three years 2015-2017 was relatively stable, indicating that the situation of rational research was taking shape. But annual traffic has fallen for the second year in a row after 2017.

Figure 1 shows that annual volume of essays in WOS has three small peaks, in 2013, 2015 and 2017, the more significant of which is the overall upward trend in 2010-2017, which shows that the international scholars on the information behavior of the research continues to advance, the results of the text continue to increase. It also shows a two-year decline after 2017.

There is something in common by comparing the volume of traffic at home and abroad that foreign traffic is much higher than at home, but the downward trend after its peak in 2017 is the same, suggesting that domestic and foreign research on information behavior may be gradually entering a period of easing, or in an era of high-profile data explosions and health information. A trend that suggests that the study is in a new period of exploration. The difference is that the

international volume is generally higher than the domestic, and the overall upward trend indicates that the international information behavior research has been showing a hot state, while the domestic trend as a whole tends to form a stable research state.
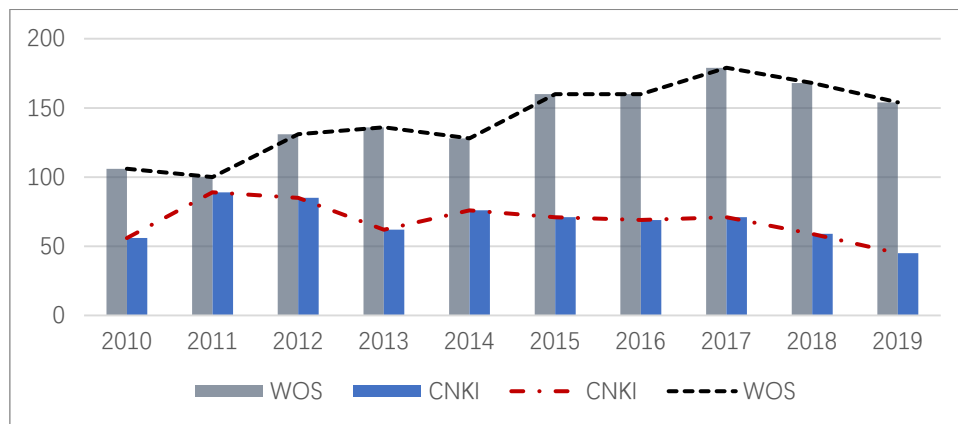

Figure 1. Changes in the number of articles on information behavior at home and abroad

3.2 Word Frequency Analysis of Keywords

Word frequency statistics refer to the frequency of keywords appearing in the extraction of sample data. Changes in the field of word frequency reaction and research trends. In this study, 117 domestic studies have pointed to different keywords by Using SATI3.2. The portion is shown in Figure 2. the test of diversity is faced, the crossed, merged and banned subject is faced, and the research method and discipline service and means level innovation are faced, owing to the LIS is the main subject,
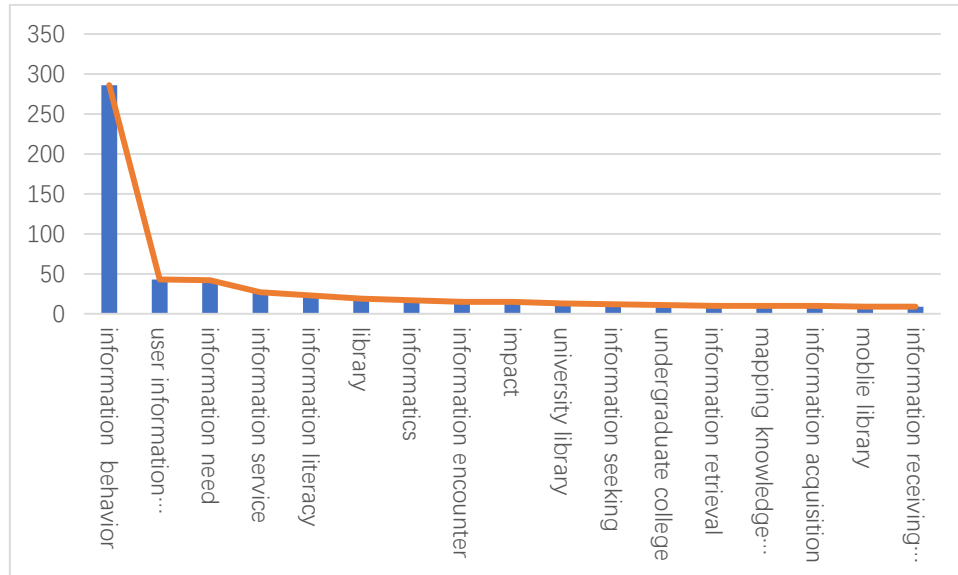

Figure 2. Word frequency in the direction of hot spots in domestic research

From the point of view of WOS, 3305 keywords was got by the combination of similar semantics and culling irrelevant semantics. Some of which are shown in Figure 3. Because the study of information behavior can not be separated from the network, the information itself can not be separated from the collision of thought, the information is dependent. This series of topic articles reflects the cutting-edge direction of international scholars' research, such as the use of wearable behavior data to do multi-view research on health information behavior, Psychologists obtain behavioral characteristics of information through eye movement experiment analysis. In addition, there are most studies related to intelligence, library science, information search, demand, negative slack, etc. The subject area is wide, scattered and the core of research is remarkable.
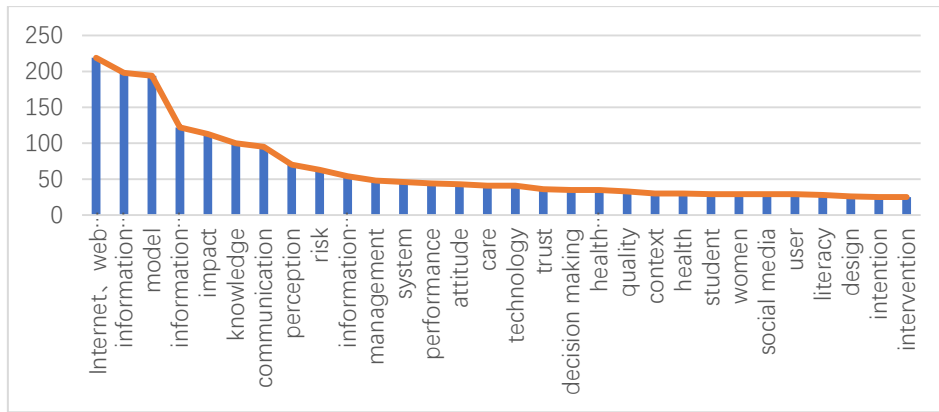
Figure 3. Foreign research hot word frequency

From the point of view of word frequency, the common ground is that the research concern of "information demand" at home and abroad is high. Foreign attention to information demand continues to rise, but domestic information needs are particularly prominent. The usefulness and ease of information retrieval system directly affect the user's information technology behavior in the network age [19]. H. Enwald [34] found that when an elderly person encounters difficult information to obtain and understand can choose to give up the search, while creating negative emotions. The theory of ease of use and usefulness of the system derives from the technology acceptance model. This suggests that domestic research may have reached a turning point in the process of TAM verification or practice, and that without a simple and efficient information retrieval system, optimization at the level of information service mode, service mode and service means is too macro for users to meet the demand for users. The improvement of information literacy can not fundamentally weaken the negative impact of the system tools on which information behavior is relied.

Due to the objective reasons of English word parting, this study based on jiang Tingting[20] and others' research, the combination and reorganization of keywords found a number of deep hidden information. The differences are as follows.

a. Lu and Yuan[21] considered that there is some correlation between information needs and information sources by setting "information requirements" as the variable indicators related to the selection of information sources. The word frequency analysis of this study confirms this prediction. "choice", "impact", "internet use", "decision making" and other words appear at the same time, indicating that traditional information behavior may be hit by the Internet. There are more choices for users in various information behavior such as search and retrieval. This has led more scholars to pay attention to this cause. While there is no correlation study of similar behavior choice and user behavior decision-making in China.

b. Information search is a measure for users to meet their own needs with the need to obtain information. The research shows that information behavior involves information search pattern, the influence factor of search behavior, the search behavior of a specific user group and the specific behavior of the search process[22]. Table 4 " information search" and "information search" reflect the domestic information demand for different behavior itself, and information search / search tools and patterns experience directly affect the user's access to information, indirectly affect the user's confidence and patience in information acquisition. Specifically, such as "design," "strategy," "motivation," "pattern", and "student," "women," "children," "social media, " the patterns that reflect information behavior, factors and even the embodiment of group characteristics.

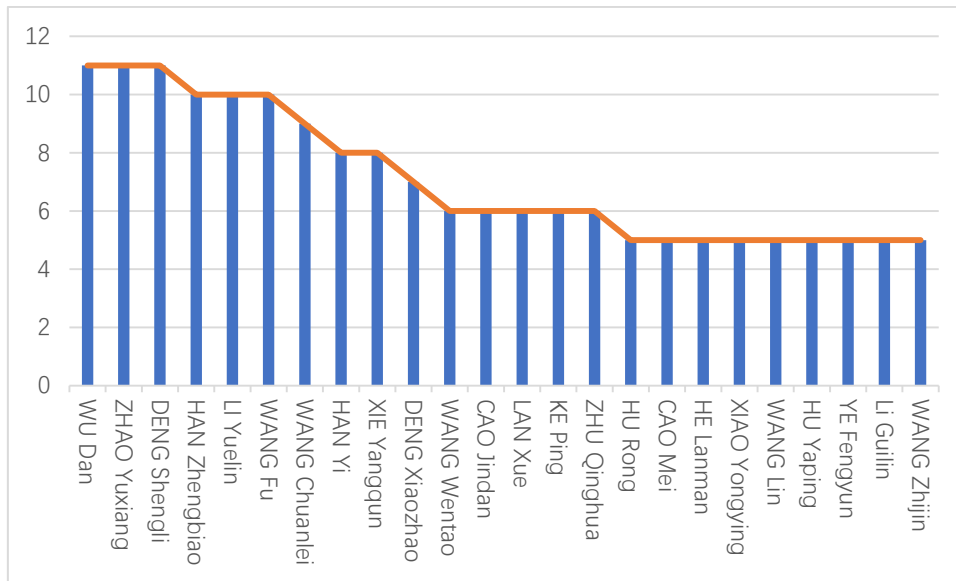## 3.3 Analysis of the Volume of Essays by Core Authors

Figure 4. Domestic core authors and essays

Analysis of the core authors and volume of information behavior research at home and abroad will help domestic scholars to effectively control and understand the current situation and research strength of information behavior research at home and abroad. Figure 4 shows that there are more core researchers in the field of information behavior in China. The research strength and level reflect a certain degree of difference. The amount of writing is misplaced and scrambling. Thus formed the core leading author in the field. Wuhan University leads the way in many institutions and authors in China, As well as Wuhan University's Deng Victory teacher in the core authors of a crown.

The core authors of foreign information behavior are shown in Figure 5. Obviously, there are significant differences in the field of information behavior research at home and abroad. The main findings are reflected below. Foreign researchers, and foreign core authors issuing papers is consistent with the 2-8 law extremely namely 80% of the author's writing strength is equivalent. Institutional strength is equal.
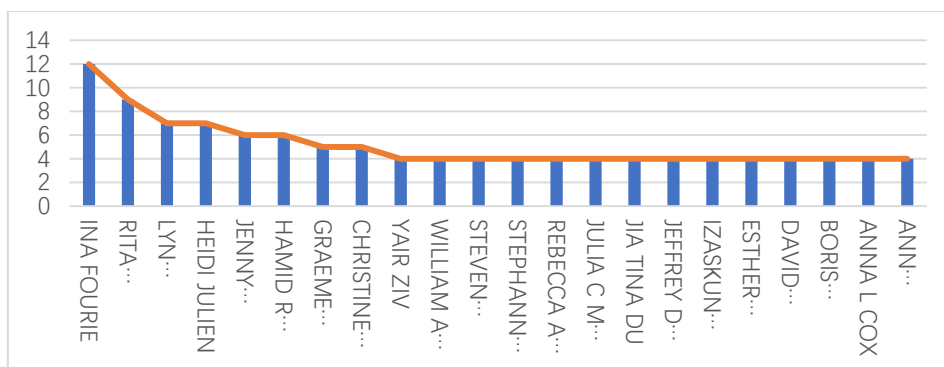

Figure 5. Foreign Core Authors and Essays

The diversity and focus of the research direction are closely related to the author's diligent study. Among them, the contribution of high-yielding authors is outstanding, and the cooperation between high-yielding authors is close. Stability is an important manifestation of academic innovation. Figure 6 shows the domestic high-yielding authors of the cooperative present picture. Information behavior started early in China, but there is no shortage of influential authors in the direction of information behavior research. The partnership presents a reunion, a tight lysing network that has not yet been formed. The main embodiment is as follows. Wang Wenxuan and Xie Yangqun, Wang

Zhijin and Han Zhengxuan had cooperation, but this cooperative relationship is relatively single, failed to form a fixed research team.

Figure 6. Domestic author partnerships

Figure 7. Foreign Author Partnership

Figure 7 is a network of foreign authors' cooperation. Foreign initial cooperation system, and two cooperation as the main way. More prominent is the existence of the region's fixed core authors, the position of strength is significant. But the communication between scholars or teams is not obvious, slightly inferior to domestic. And foreign cooperation network relations are relatively single, the cooperative relationship is more loose. The more significant international team collaboration is PENG LI, JINGYA WU, NIANNIAN LI, SHUMAN XU, etc.

4. Knowledge-based Analysis

By analyzing the knowledge base, the researcher can better understand the development of LIS and the research basis. The knowledge base is conducive to further indicating the cutting - edge nature of research. The concept of "research frontier" was first proposed by Price and is used to reflect the dynamic nature of development in the field of research. The research frontiers are seen by Chen Chaomei as emerging theoretical trends and the emergence of new topics, which can be expressed through changes in topics, abstracts, keywords and their sudden increase in frequency of appearance [29].

Timeline clustering represents the current state of scientific research ideas in a field of research. We can see the development between the time and keywords of information behavior research. The domestic and international information behavior keyword timeline view generated in this study uses the CiteSpace.5.5.5R2, the subject word type is "Noun Phrases", the node type is "keyword" and "category", and the tailoring algorithm is "Pathfinder", Visually with " timeline ". The view evaluation indicators are shown as follows: Figure 8 Q is 0.57, S is 0.53, the separableity of clustering is obvious, the independence effect of clustering is better, so it can be used as a research object; Q is 0.43, S is 0.58, the view is slightly less separable, the independence is better[27,28].

As shown in Figure 8, the changes in the frontiers of research and the basis of knowledge over the past decade are reflected. Researchers study information behavior from the perspective of information demand around 2010. The focus is on the study of information behavior from the external environment of information around 2013. And the emergence of hot spots are significant and long-lasting. Due to the introduction of advanced medical knowledge such as wearables, which stimulates people's need for life, research on "health information", "cognitive needs" and "collaborative information behavior" began to appear around 2016. The emergence of "user portraits" and "information acceptance of the mood" around 2019 is a derivative of the user's demand behavior, by constructing its portrait, analyzing its deep needs, and providing services, paying attention to the user's mood and situation.

"Library" "Digital Library" and "Library Science" run throughout, indicating that library users in information behavior research have always been a hot spot, and their development trend is unstoppable. In particular, the "university students" group, as one of the large number of special user groups to promote library research. And public utility culture continues to promote and attach importance to the research is also deepening in China.

The heat of the Internet has led to the research of network behavior playing an important role in guiding in the last ten years. The emergence of "big data" and "Internet" is related to information technology, which requires not only the study of user information behavior in the traditional industry, but also the dimension and depth of information behavior research[30]. The emergence and development of "social media" is a new type of online media that gives users great room to participate[31], providing users with the construction of a variety of content communities, changing their behavior patterns, and generating new information behaviors to adapt to new media, such as paste bars, blogs and so on. It can be seen that due to the influence of the Internet, the study of Internet behavior data, social media and network information behavior is bound to be the hot topic of information behavior research for some time to come.
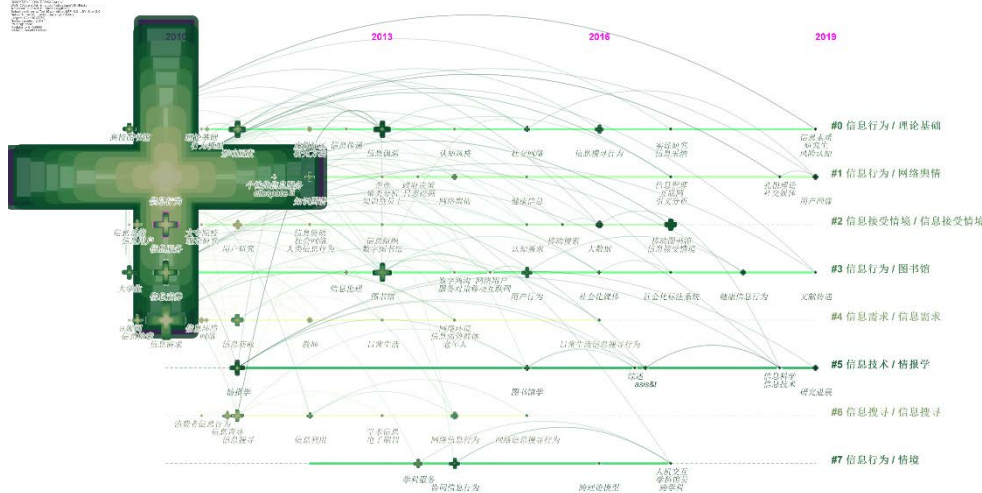

Figure 8. View of the domestic information behavior keyword co-present timeline

Figure 9 is the frontier of foreign information behavior research from 2010 to 2019. Frequent keywords such as "need" "seeking" "decision making" and "communication" around 2010 indicate

that the public is focused on information needs and decision-making. The emergence of keywords such as "management" and "health information" around 2013 indicates that users search for more health information. The emergence of keywords such as "online", " retrieval " and "social media" highlights increased focus on user experience from 2016 to 2019. Each year's research hot spots are closely linked, and layer by layer. The data show that the points of study are becoming more and more clear, and reflecting the information behavior generated by the user from communication to demand. In addition, the research hot spots from search and decision-making evolved into network and social media. There are similarities and differences at home and abroad.

Figure 9 is a significant foreign attention to health information in recent years. Foreign research often adopts a combination of many factors, such as qualitative and quantitative, models and practices. For example, the field of health information behavior research theory is rich, emphasizing the combination of behavioral, management, communication and other theoretical models. G. E. Khalil [32] adopts the protective motivation theoretical framework model to consider the impact of cancer perception and information-sought behavior in the college population from the two dimensions of threat and response assessment. J. Y. Li[33] stated that the disclosure of AIDS information is a communication process for the exchange of information, and that the integration of elements of communication theory in the disclosure process is intended to combine the cause and cause of disclosure. Information behavior influence factors of user groups studied abroad, through a variety of theoretical model optimization. They combine with a variety of experiments and study behaviors that are consistent with the characteristics of the times.
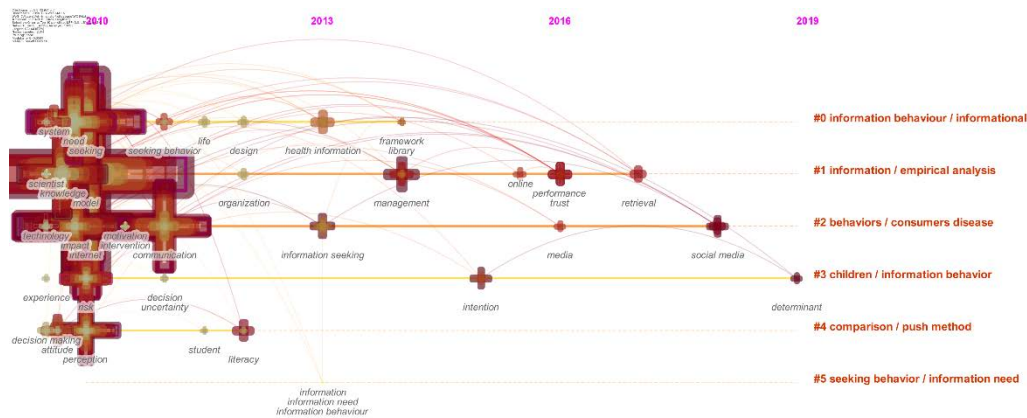

Figure 9. View of the domestic information behavior keyword co-present timeline

Comparing the development trend of time view at home and abroad, the domestic hot spot direction presents the characteristics of diversity and complexity, while the hot spot of foreign more focused than domestic, the research time is longer, the significance is greater. At the same time, the amount of paper at home and abroad also shows a trend of simultaneous decline. This reflects a certain pattern to some extent.

5. Conclusion

This study mainly makes a comparative analysis of the characteristics, trends and hot spots in the field of information behavior research at home and abroad through mainstream measurement tools and algorithms in order to show the characteristics of research in this field at home and abroad, and provide a reference for future research direction through visual analysis and objective description. Several research conclusions are as follows.

a. The research shows that the development of the LIS has a profound technical tradition. Information behavior research based on modern cutting-edge technology and application scenarios has emerged at the same time. With the arrival of artificial intelligence, block-chain, big data and other related technologies, the application scenarios around these technologies (such as digital

government, smart cities, smart libraries, smart old age, smart medicine, etc.) will have an important impact on the study of information behavior.

b. The depth of the research methods based on innovation theory or micro cognitive and macro behavior may wipe out the spark of scientific research. Based on the Internet era focus on the "plus" element, the breadth can be broad group, different environment, integrated technology, interdisciplinary disciplines, innovative theories, etc.

c. The discipline of LIS can take comprehensive attraction in the cross-integration of disciplines, in order to gather more academic wisdom and enrich research methods and ideas. A single knowledge structure may not be enough to fully support this day. If researchers with different knowledge structures actively participate, they may collide with new perspectives. It is conducive to a more accurate grasp of the laws of user behavior.

d. Behavioral networks influence Chinese people, including people from three-year-olds to 80-year-olds, people with different social identities, social responsibilities, social experience. They constitute a "full" information behavior network, which is embodied in the qualitative perspective of multi-level, multi-detail, multi-situational.

Domestic research is more complex than abroad, which requires scholars to "full" perspective to explore the behavior of the law and its influencing factors, such as user characteristics, perception, psychology, emotion and so on. A brief wandering is not a permanent stop, but a silent period of thought and inquiry. The era of network behavior is more an era that needs calm and solid exploration. Because human beings are creative human beings Information, behavior is a research with no ends. The development and research of human behavior has just begun. Future research on information behavior has heavier tasks, longer goals, more directions, more general content, more cluttered processes, broader knowledge, stronger technology.

Objectively grasp the user's law, deepen the direction of behavior research, focus on scientific and technological research methods, innovate scientific theoretical achievements, based on the fundamental of the network era, and push research to a new peak with greater application, time and regularity. And highlight the "China Image ", the formation of "China normal" in the international. Domestic scholars continues to advance in the multidisciplinary, multi-perspective, diversified scientific research path.

Acknowledgements

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