

Research on the Keyword Set and Network Analysis of Academic Library Discipline Service

Fan Zhang

Guangzhou Huashang College, Guangzhou, Guangdong, China

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Abstract: The construction of subject service keyword set and network analysis in university library are of great significance for improving the quality and effect of subject service. This article takes the University of Cambridge Library in the United Kingdom as an example to elaborate on the background and purpose of constructing a subject service keyword set, and explores the connections and interactions between different subject areas through network analysis methods, exploring emerging subject areas and cutting-edge research issues. The research results indicate that university libraries need to establish keyword sets tailored to different subject areas, strengthen connections and interactions between subject areas, and pay attention to changes in user needs and preferences. In the future, university libraries can explore more refined and personalized subject service models, strengthen industry university research cooperation and technology transfer, and provide better subject services and support for users.

1. Introduction

1.1. Research Background and Significance

University libraries are important places to provide knowledge and information resource services for teachers and students, and subject services are one of the core services of university libraries. Subject services aim to provide specialized information consultation, reference consultation, literature services, etc. for teachers and students in specific subject areas to meet their academic research and teaching needs. Therefore, the subject service of university library is of great significance to university education, teaching and academic research. However, there are some problems in the practice of subject service in university libraries, such as the simplicity of service content, the relatively single service form and means, the low service quality and efficiency, and the inability to meet the diversified and personalized needs of users. Therefore, how to optimize the discipline services of university libraries and improve their quality and efficiency has become an urgent problem to be solved.

The purpose of this study is to build a keyword set and network analysis of discipline services in university libraries, to explore the keywords and their relationships of discipline services, and to provide data support and decision-making reference for discipline services. By mining the relationship between keywords, we can find the hot spots, trends and innovation points in the service field, provide a visual and operable scheme for the discipline services of university libraries,

and then promote the optimization and innovation of the discipline services of university libraries, and promote the development of education, teaching and academic research in universities.

1.2. Research Purpose and Significance

The main purpose of this study is to build a keyword set and network analysis of discipline services in university libraries, and to dig deeply into the keywords and their relationships of discipline services, so as to provide decision support and innovative solutions for discipline services in university libraries, optimize the quality and efficiency of discipline services, and improve the user satisfaction and influence of discipline services. Provide data support for academic services of university libraries. By constructing a keyword set and network analysis of disciplinary services, we aim to reveal the hotspots, trends, and innovative points in the field of disciplinary services, providing comprehensive and systematic data support and decision-making references for disciplinary services, and improving the scientificity and accuracy of services. Simultaneously providing visual and actionable solutions for disciplinary services. By visualizing and analyzing keyword networks, we provide visual solutions for subject services, making the content, form, and means of subject services clearer and easier for users to understand and accept. At the same time, we also provide actionable solutions for innovation in subject services.

It can also promote the development of higher education teaching and academic research. Discipline service of university library is an important support for university education, teaching and academic research. Optimizing the quality and efficiency of discipline service, improving user satisfaction and influence can promote the development of university education, teaching and academic research, and improve the academic reputation and social influence of universities. Therefore, the purpose of this study is to provide data support and visualization scheme for discipline services of university libraries, optimize the quality and efficiency of discipline services, and promote the development of education, teaching and academic research in universities through the construction of discipline service keyword set and network analysis, which has important theoretical and practical significance[1].

1.3. Research Content and Methods

The main content of this study is to build a keyword set of discipline services in university libraries, and conduct network analysis based on the keyword set, so as to deeply mine the keywords and their relationships of discipline services, so as to provide decision support and innovative solutions for discipline services in university libraries, optimize the quality and efficiency of discipline services, and improve the user satisfaction and influence of discipline services.

In terms of constructing the keyword set of discipline services, this research will identify the core keywords in the field of discipline services through literature research, expert interviews, user research and other ways, and establish a keyword glossary. At the same time, this research will use natural language processing technology and topic model analysis method to process and analyze text data in the discipline service field, extract keyword, theme, emotion and other information, and constantly improve and optimize the keyword set.

In terms of network analysis, this study will use complex network theory, social network analysis methods, etc. to construct a network model of subject service keywords, analyze network indicators such as correlation relationships, degree centrality, and betweenness centrality between keywords, and explore the hotspots, trends, and innovative points of subject service. At the same time, this study will also combine visualization technology to visually display and analyze keyword networks, providing a visualization solution for subject services.

To sum up, this research will use a variety of methods, such as literature research, expert interviews, user research, natural language processing, topic model analysis, complex network theory, social network analysis and visualization technology, to build a keyword set of discipline services and conduct network analysis, so as to deeply mine the keywords and their associations of discipline services, and provide decision support and innovative solutions for discipline services of university libraries, Optimize the quality and efficiency of disciplinary services, improve user satisfaction and influence of disciplinary services.

2. Related Concepts and Theories

2.1. Overview of Subject Services in University Libraries

Subject service of university library refers to that the library provides corresponding literature resources, information services and knowledge support to meet the needs of users for academic research, teaching and learning in the process of serving subject students, teachers and researchers according to the characteristics of the subject. Discipline service of university library is one of the important service forms of university library, which is directly related to the quality and efficiency of discipline service, and is one of the core contents of university library service. With the constant deepening of discipline construction and the constant updating of discipline knowledge in colleges and universities, the discipline services of university libraries are also constantly developing and innovating. By introducing new technologies, new service models and new thinking, we can strengthen the publicity and promotion of discipline services, improve the quality and influence of discipline services, and better support the teaching, scientific research and academic development of colleges and universities.

2.2. Definition and Classification of Subject Service Keywords

Subject service keywords refer to the keywords related to the subject field in the process of subject service of university library, such as subject nouns, popular research directions, important scholars, etc. These keywords are one of the core contents of subject service and have an important impact on the quality and efficiency of subject service. According to the characteristics and needs of subject services, the keywords of subject services in university libraries can be classified differently. One is to classify according to disciplinary fields, such as literature, history, economics, law, education, medicine, etc. This classification method can help university libraries provide targeted subject services for different subject areas, better meeting the needs of users. The second is to classify according to the type of disciplinary services, such as literature resources, information services, knowledge support, etc. This classification method can help university libraries clarify the types and content of subject services, thereby better organizing and providing subject services. The third is to classify according to user types, such as undergraduate students, graduate students, teachers, researchers, etc. This classification method can help university libraries better understand the needs and characteristics of different user groups, and provide targeted subject services [2].

Subject service keywords of university library are one of the core contents of subject services, which can be sorted and summarized according to different classification methods, so as to better organize and provide subject services and meet the needs of users.

2.3. The Concept and Principles of Network Analysis

Keyword set network analysis is a network analysis method based on keyword sets, aiming to reveal the importance and connections between keywords by analyzing their interrelationships, and

further gain a deeper understanding of the characteristics and development trends of the research field [3]. The principle is to construct a co-occurrence matrix between keyword sets and conduct network analysis based on this matrix, including the calculation of indicators such as degree centrality, intermediate centrality, and tight centrality, in order to reveal the importance and connections between keyword sets, and further analyze the characteristics and development trends of the research field. This method can effectively identify research hotspots, important scholars, and core fields in the research field, and has important reference significance for providing and improving subject services in university libraries.

3. Construction of Subject Service Keyword Set in University Library

3.1. Methods and Tools for Keyword Mining

Library discipline service keyword mining refers to mining keywords related to discipline services from massive literature data through data mining technology and related tools, so as to provide university libraries with reference on the content and form of discipline services. The following are several commonly used keyword mining methods and tools:

(1) Literature metrology method: This method digs out information such as research hotspots, core authors, keywords, etc. in discipline services through statistics and analysis of academic literature. Common literature metrology tools include Web of Science, Scopus, etc.

(2) Machine learning method: This method uses machine learning algorithms to classify, cluster, and predict text data, thereby mining keywords in subject services. Commonly used machine learning tools include Python language scikit-learn, and others.

(3) Natural language processing method: This method mines keywords in subject services by segmenting text data, removing stop words, part of speech tagging and other operations. Common natural language processing tools include Python NLTK, Stanford CoreNLP, etc.

(4) Topic model method: This method mines research hotspots and keywords in subject services through topic modeling of text data. Common topic model tools include Latent Dirichlet Allocation (LDA), etc.

The mining of library discipline service keywords can be realized through a variety of methods and tools. Different methods and tools have different advantages and disadvantages in different application scenarios. University libraries can choose appropriate methods and tools according to actual needs and conditions.

3.2. The Construction Process and Steps of Subject Service Keyword Set in University Library

The construction process and steps of the library's subject service keyword set usually include the following stages:

(1) Collection of literature data: Select an appropriate literature database for retrieval, search based on relevant subject words and keywords, and select literature related to subject services. In general, authoritative academic and library databases both domestically and internationally can be selected for retrieval, such as CNKI, Wanfang Data, Google Academic, Web of Science, EBSCO, etc.

(2) Preprocessing of literature data: Deduplication, screening, and cleaning of literature data, eliminating irrelevant and duplicate literature, and retaining key data. In terms of deduplication, literature management software such as EndNote, Note Express, etc. can be used for deduplication. In terms of screening and cleaning, it is necessary to carefully read the literature to determine whether it meets the requirements for constructing a subject service keyword set.

(3) Keyword extraction: Extract information such as abstracts, titles, and keywords from literature to form a keyword list. Keyword extraction can be done automatically or manually using literature management software. Manual extraction requires in-depth reading of the literature to identify key information and keywords.

(4) Keyword screening: Filter the extracted keywords and select keywords related to subject services based on certain rules and standards. For example, keywords related to a discipline can be selected based on its scope of service and research field, and irrelevant keywords can be excluded.

(5) Keyword classification: Classify keywords based on their topic and domain, facilitating subsequent analysis and application. Classification can be based on factors such as the subject area, theme, and source of the keywords. For example, keywords can be classified by subject area, such as computer science, social sciences, medicine, etc; Keywords can also be classified by topic, such as information services, academic media, digital resources, etc.

(6) Keyword statistics and analysis: Conduct statistics and analysis on the classified keywords, calculate their occurrence frequency, co-occurrence relationship, weight, and other indicators, and reveal the relationships and characteristics between keywords. Statistics and analysis can be conducted using literature management software, data analysis tools, visualization tools, etc.

(7) Construction and visualization of keyword network: Based on the co-occurrence relationship between keywords, construct the network structure between keywords, and display it through network visualization tools to form an intuitive keyword network diagram.

3.3. Visualization and Analysis of Keyword Sets

Visualization and analysis are important steps in keyword set network analysis, which can help us better understand the relationships between keywords and their importance in subject services. The following is the main content of visualization and analysis of the keyword set of library discipline services. Firstly, it is necessary to convert the keyword set into a graphical representation. This can be achieved through software tools such as Gephi and Cytoscape. These tools can convert keywords into nodes and represent the connections between them as edges. In this process, it is necessary to choose an appropriate layout algorithm to ensure that nodes and edges can be displayed in a readable manner. Secondly, it is necessary to analyze the graphics to identify the main patterns and trends within them. This can be achieved through various metrics and algorithms, such as network centrality, community detection, and node degree analysis. These tools can help us determine which keywords are most important in the entire keyword set and which keywords have the closest connection between them. In addition, visual tools can also be used to visualize these analysis results in order to better understand them. Finally, the analysis results need to be used to guide the improvement of disciplinary services. For example, if it is found that certain keywords are important in the entire keyword set but receive insufficient attention in actual services, it can be considered to increase relevant resources or improve service strategies to better meet user needs. Therefore, keyword set visualization and analysis are important tools that can help libraries optimize subject services, improve user satisfaction, and utilization rates.

4. Network Analysis of Subject Service Keyword Set in University Library

4.1. Basic Characteristics and Measurement Indicators of Keyword Networks

Keyword network refers to the network formed by the relationship between keywords in the field of library discipline services. Understanding the basic characteristics and measurement indicators of this network can help us better understand the interaction between research hotspots and keywords in the field of subject services, and guide the planning and practice of library subject services. Here

are some basic characteristics and measurement indicators of the network:

(1) Number of nodes and number of edges: The number of nodes refers to the number of keywords, while the number of edges refers to the number of connections between keywords. This indicator can help us understand the scale and complexity of the network. The more nodes and edges, the larger the network, and the more complex the connections between keywords.

(2) Average degree: The average degree refers to the average number of edges of a node. This can help us understand the relative importance of nodes in the network. In this network, nodes with high degrees typically represent research hotspots and important keywords.

(3) Network density: Network density refers to the ratio of the actual number of edges in a network to the number of all possible edges. It can help us understand the tightness of the network. The higher the network density, the closer the connection between keywords.

(4) Network connectivity: Network connectivity refers to the connectivity between nodes in a network. It can help us understand the structure of the network and the interactions between nodes. In this network, if all nodes have edge connections between them, then the network is completely connected.

(5) Node centrality: Node centrality refers to the degree of importance of nodes in the network. For example, betweenness centrality can measure the importance of nodes in the shortest path. In this network, nodes with high centrality typically represent important keywords and research hotspots. By calculating node centrality, we can further understand the importance and influence of various keywords in the network.

Understanding the basic characteristics and measurement indicators of the subject service keyword network of university libraries can help us better understand the interaction between research hotspots and keywords in the field of subject services, and then guide the planning and practice of library subject services.

4.2. Community Discovery and Analysis of Keyword Networks

In keyword networks, there are different clusters or communities that have certain internal connections and interactions. Therefore, community discovery and analysis can be used to gain a deeper understanding of the structure and characteristics of the network[4].Community discovery refers to the aggregation of nodes with similar characteristics in a network into a community, while community analysis involves quantitative and qualitative analysis of the community to better understand and explain its nature and function. Community discovery and analysis can help us identify the main components of the network, discover hidden patterns and structures, and further explore the role and significance of these components in disciplinary services. In keyword networks, community discovery and analysis can provide important decision support and service guidance for libraries, helping them better meet user needs and optimize subject services.

4.3. Node Centrality Analysis of Keyword Networks

Node centrality is one of the measures of the importance of nodes in a network, which can help us understand the status and influence of network nodes in the entire network. In keyword networks, node centrality analysis can help us identify important nodes in the network, thereby better understanding the structure and characteristics of subject services. Specifically, node centrality analysis typically includes metrics such as degree centrality, intermediate centrality, and proximity centrality. Among them, degree centrality refers to the number of connections a node has in the network, intermediate centrality refers to the degree to which a node serves as a bridge in the network, and proximity centrality refers to the distance between a node and other nodes in the network. Through node centrality analysis, we can identify key subject service keyword nodes and

further understand the role and importance of these nodes in subject services, thereby optimizing the subject services of university libraries.

5. Case Study: Keyword Set and Network Analysis of Discipline Services in Cambridge University Library

5.1. Background and Purpose of the Case

The University of Cambridge Library is a globally renowned higher education institution with abundant academic resources and excellent subject service teams. In the increasingly fierce competition among universities, the Cambridge University Library has realized the importance and necessity of subject services, and has improved the quality and efficiency of its subject services through analysis and research on keyword sets. The background of this study is that the University of Cambridge Library is facing an increasing demand for disciplinary services and the differences between different disciplinary fields. It needs to better understand user needs and preferences, and provide more accurate and effective services for users in different disciplinary fields. This study aims to reveal the themes and hotspots of different disciplinary fields by constructing and analyzing the keyword set of disciplinary services, and provide support for innovation and optimization of disciplinary services. The purpose of this study is to improve the sustainability and impact of disciplinary services, and to provide users with more high-quality academic resources and support services. By analyzing the keyword set, the Cambridge University Library can discover the connections and differences between different disciplinary fields, providing a clearer direction and focus for its disciplinary service team. At the same time, this study can also provide experience and reference for other university libraries, promoting the common development of subject services.

5.2. Construction of Keyword Set and Network Analysis Results

The Cambridge University Library has constructed a set of keyword sets covering multiple subject areas through a survey and analysis of user needs for subject services. These keyword sets include multiple fields such as basic disciplines, applied disciplines, and interdisciplinary disciplines, providing important support and guidance for the disciplinary services of the Cambridge University Library. On the basis of constructing a keyword set, the University of Cambridge Library has conducted further research and analysis on the subject service keyword set using network analysis methods [5, 6]. By constructing a network of relationships between subject service keywords, the Cambridge University Library has revealed the connections and differences between different subject areas, identified some representative and hot topics and issues, and provided important references for innovation and optimization of subject services. Specifically, the University of Cambridge Library has found that the grid of relationships between different disciplinary fields is complex and diverse, exhibiting clear intersections and interactions. For example, there is a close connection between the fields of cultural research and art, social sciences, and humanities, reflecting the trend of interdisciplinary and interdisciplinary research. In addition, the University of Cambridge Library has found that some emerging disciplinary fields and cutting-edge and innovative research issues, such as artificial intelligence, sustainable development, big data, etc., are becoming popular themes and focal points for disciplinary services[7, 8]. The research results of constructing these keyword sets and network analysis provide important guidance and support for the Cambridge University Library, helping it better understand the needs and preferences of different disciplinary fields, and providing important ideas and directions for innovation and optimization of disciplinary services. At the same time, these research results also provide valuable experience and inspiration for other university libraries, promoting the common

development of subject services.

5.3. Result Analysis and Inspiration

The keyword set construction and network analysis research results of the Cambridge University Library provide important insights for the disciplinary services of university libraries. Firstly, university libraries need to attach importance to the construction and optimization of keyword sets for subject services, and establish keyword sets tailored to different subject areas to meet user needs and preferences. Secondly, university libraries should use methods such as network analysis to deeply explore the connections and interactions between different disciplinary fields, identify emerging disciplinary fields and cutting-edge research issues, and provide important references for innovation and optimization of disciplinary services[7, 8]. In addition, university libraries should strengthen communication and cooperation with other university libraries and institutions, share experiences and resources, and jointly promote the development and innovation of subject services[9, 10]. Finally, university libraries need to constantly pay attention to and adapt to changes in user needs and preferences, continuously improve the quality and effectiveness of subject services, and provide better support and services for the vast number of users[11].

6. Conclusions

Through the research on the construction of subject service keyword set and network analysis of university libraries, we found that university libraries need to establish keyword sets for different subject areas to meet user needs and preferences, and need to strengthen the connection and interaction between subject areas, dig new subject areas and cutting-edge research issues, so as to improve the quality and effectiveness of subject services. At the same time, university libraries need to pay attention to changes in user needs and preferences, adjust discipline service strategies and directions in a timely manner, and provide better support and services for the vast number of users. In terms of future prospects, university libraries can explore more refined and personalized subject service models, analyze user behavior and preferences through technological means such as big data and artificial intelligence, and provide personalized subject services and recommendations. In addition, university libraries can also strengthen cooperation with industries and enterprises, carry out industry university research cooperation and technology transfer, promote the application and innovation of subject services, and provide more practical support and services for students and teachers. In short, university libraries need to continuously improve the quality and effectiveness of subject services, adapt to the needs of the times, and provide better subject services and support for users.

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