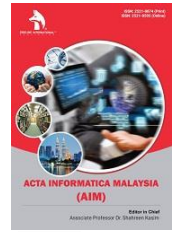


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RESEARCH ARTICLE

RESEARCH ON KEYWORD MINING OF ACADEMIC LIBRARY SUBJECT SERVICE

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ABSTRACT

This research aims to explore the application of keyword mining technology in academic services of university libraries, and conducts in-depth research on the algorithm and technology of keyword mining technology, the analysis method and application of keyword mining results, the evaluation indicators of keyword mining results, and the design and implementation of optimization strategies. Empirical research has shown that the subject service model based on keyword mining can effectively improve the level of subject service in libraries, providing users with more accurate and comprehensive information resource services. However, there are still some limitations and shortcomings in this study. In the future, we can continue to explore the optimization of keyword mining technology and combine it with other artificial intelligence technologies to develop more intelligent and personalized subject service models. In a word, this study provides some valuable ideas and methods for academic library discipline services, which has certain theoretical and practical significance.

KEYWORDS

University library, discipline service, keyword mining, algorithm and technical, data preprocessing.

1. INTRODUCTION

1.1 Research Background and Significance

The core of disciplinary services lies in meeting users' needs for disciplinary information and providing users with more accurate and efficient services. As an important element of information retrieval and representation, keywords have a significant impact on the quality and efficiency of disciplinary services. Therefore, through the research on the keyword mining of subject services in university libraries, we can deeply tap the needs of users and better meet their information acquisition needs; At the same time, it also contributes to the construction of subject resources and service improvement in university libraries, improving the quality and efficiency of services. In addition, the application of keyword mining technology in subject services can also provide certain support for knowledge management and intelligent services in university libraries, promoting the informationization construction and development of university libraries.

1.2 Research Status at Home and Abroad

In recent years, keyword mining technology has been widely applied in the field of libraries, and its research in subject services has also received increasing attention. Scholars at home and abroad have carried out different discussions and analyses on the research status of keyword mining for academic services in university libraries. The domestic research mainly focuses on the research of keyword mining algorithms and methods, as well as the application of keyword mining in subject services of university libraries. However, foreign research focuses more on the development and improvement of keyword mining technology, as well as its practical application in subject services. In addition, there are also studies on cross-border cooperation, mainly focusing on the comparison and analysis of keyword mining in disciplinary services under different cultural backgrounds. In general, scholars at home and abroad have made some progress in the research on keyword mining of subject

services in university libraries. In the future, further exploration is needed on how to apply keyword mining technology more effectively to the subject services of university libraries, improve the quality and efficiency of services, and provide users with more satisfactory services.

1.3 Research Purpose and Content

The purpose of the research is to improve the quality and efficiency of discipline services in university libraries through keyword mining technology. Specifically, this study aims to achieve the following objectives:

- 1) Understand the current situation of subject services in university libraries: This research will investigate and analyze the subject services in university libraries, so as to deeply understand the needs of users and service bottlenecks.
- 2) Exploring the theory and methods of keyword mining technology: This study will conduct in-depth research and analysis on the development history, algorithm principles, and implementation methods of keyword mining technology to ensure that it can be used correctly and effectively in subsequent applications.
- 3) Determine the application scenario of keyword mining technology in the discipline service of university library: This research will determine the application scenario and application method of keyword mining technology in this field according to the discipline service demand and user characteristics of university library.
- 4) Carry out empirical research and analysis: This research will carry out empirical research according to the determined application scenarios and methods, and analyze and summarize the research results to evaluate the actual effect of keyword mining technology in the discipline services of university libraries.

In a word, this research aims to use keyword mining technology to

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improve the quality and efficiency of discipline services in university libraries, provide better services for university libraries, and provide better support for discipline research and teaching. At the same time, this study will also provide new ideas and practical references for the application of keyword mining technology in subject information management.

1.4 Research Methods and Ideas

The methods used in this study mainly include literature review, research, keyword mining, and empirical research. First of all, we will review and analyze the literature in relevant fields at home and abroad to deeply understand the application status and development trend of keyword mining technology in subject services of university libraries. At the same time, we will also understand the current situation of academic services and user needs of university libraries through research and interviews, so as to provide data support and practical application background for subsequent research. Secondly, this research will use natural language processing technology and data mining methods to analyze and process the discipline service data of university libraries to determine the method and application scenario of keyword mining. In the process of keyword mining, we will filter and optimize the mining results based on actual data and user needs to ensure the accuracy and practicality of the mining results. Finally, this study will conduct an empirical study on the application of keyword mining technology in academic library discipline services, and analyze and summarize the research results. We will use experimental design and statistical analysis methods to evaluate the actual effect and feasibility of keyword mining technology in university library discipline services, and provide reference for subsequent application and improvement. In a word, this research will combine theoretical research and empirical research, and adopt a variety of research methods and means to achieve the goal and significance of keyword mining in academic library discipline services.

2. CONCEPT AND CHARACTERISTICS OF SUBJECT SERVICE IN UNIVERSITY LIBRARY

2.1 Definition of Subject Service of University Library

Academic library discipline service refers to the professional service provided by the library for university teaching, scientific research and academic exchange, with the goal of meeting users' needs for discipline resources and information and improving users' information literacy. Academic library subject services include but are not limited to the procurement, cataloging, sorting, borrowing and consulting services of library collections, as well as the ordering, management and use guidance of electronic resources such as subject databases, e-books and periodicals. In the current digital era, the scope of academic services of university libraries is expanding, and they are also gradually developing towards digitalization, intelligence, personalization and other directions to better meet the learning, teaching and research needs of university users.

2.2 Characteristics of Subject Services in University Libraries

Academic library discipline services have the following characteristics:

Discipline specialization: the service objects of academic library discipline services are teaching, scientific research and academic exchanges in colleges and universities, so the service contents and methods have the characteristics of discipline specialization to meet the needs of users for professional knowledge and information;

Informatization and digitalization: with the development of information technology and the wide application of digital resources, academic services in university libraries are gradually developing towards digitalization, intelligence, networking and other directions to better provide users with convenient services;

Personalized service: Academic library discipline service not only provides basic literature resources, but also gradually develops towards personalized service. For example, providing personalized recommendations and customized services based on users' needs and interests; **Diversified services:** In addition to traditional library services, university library discipline services also include academic paper retrieval, data analysis, knowledge management, scientific research consulting and other services to meet diversified user needs.

In a word, the discipline service of university library has the characteristics of discipline specialization, informatization, digitalization, personalization and diversification, which constantly meets the needs of users and provides strong support for university teaching, scientific

research and academic exchanges.

2.3 Objectives of Subject Services in University Libraries

The goal of subject services in university libraries is to provide comprehensive, high-quality and diversified resources and services for university teaching, scientific research and academic exchanges to support university users' learning, teaching and scientific research. Specifically, the objectives of subject services of university libraries include: providing subject information resources, supporting teaching and research, improving users' information literacy, and promoting academic exchanges. First of all, university library discipline service is committed to providing comprehensive, timely and accurate discipline information resources, including books, journals, databases, e-books, etc. Secondly, the goal of subject services in university libraries is to provide university users with services and resources to support teaching and scientific research, such as subject consultation, literature retrieval, knowledge management, etc. Third, academic library discipline service is also committed to improving users' information literacy, helping users learn to use information resources effectively, and improving information search, evaluation and utilization capabilities. Finally, the goal of subject services of university libraries also includes promoting academic exchanges and supporting university users to participate in academic research, academic exchanges and international cooperation. Provide communication platforms and opportunities for university users through the provision of academic literature resources and the organization of academic activities (Wan et al., 2023).

3. THEORETICAL BASIS OF KEYWORD MINING METHODS

3.1 Concept and Definition of Keyword Mining

Keyword mining is a natural language processing technology. Through the processing and analysis of text data, it can automatically find keywords or phrases in the text. Keyword mining aims to provide support for applications such as text classification, information retrieval, and text summarization by mining keywords or phrases in text. It determines which words or phrases are the most representative and important by calculating indicators such as frequency, weight, and relevance of words or phrases in the text. Keyword mining is often combined with text mining, information extraction, machine learning and other technologies, and can be used in natural language processing, data mining, recommendation systems and other fields. In practical applications, keyword mining can help people quickly and accurately obtain the theme, content, and information of text, improving the efficiency and quality of text processing.

3.2 Algorithms and Techniques for Keyword Mining

The algorithms and technologies for keyword mining mainly include statistical based methods, semantic based methods, and machine learning based methods. The statistical based method is the most commonly used keyword mining algorithm, which determines the weight of words or phrases based on their frequency of occurrence in the text. TF-IDF is a widely used statistical method that measures the importance of words in text by calculating their frequency and inverse document frequency. Semantic based methods use the relationship between words and Semantic information to determine keywords. Topic model is a common semantic based keyword mining algorithm, which can find the association between potential topics and words in text. Machine learning based methods determine keywords through training models, including classifiers, clustering algorithms, etc. Among them, support vector machine, naive Bayes and decision tree are common classifiers for keyword mining, and clustering algorithms include K-Means, hierarchical clustering, etc. In addition to these traditional algorithms and technologies, deep learning technology has also been applied in the field of keyword mining in recent years, such as keyword extraction models based on neural networks and convolutional neural networks. The emergence and development of these technologies have provided more options and possibilities for keyword mining.

3.3 Application of Keyword Mining in Subject Services

Keyword mining technology has a wide range of applications in subject services, mainly reflected in the following aspects: firstly, keyword mining can be used for subject resource construction and management. By mining keywords from relevant literature in the discipline, we can understand the hotspots and frontiers of discipline research, and provide reference for the procurement and management of discipline resources. Secondly, keyword mining can be used for the analysis and evaluation of disciplinary research. By mining keywords from relevant literature in the discipline, we can understand the development trends, hotspots, and important

achievements of discipline research, thereby providing support for discipline evaluation and development. Thirdly, keyword mining can be used for personalized recommendation of subject services. By analyzing the information needs of users, keyword mining technology is used to recommend relevant subject resources and services to meet their information needs. Fourthly, keyword mining can be used for knowledge management in subject services. By mining keywords from relevant literature on disciplines, a disciplinary knowledge graph can be established to help discipline service personnel better manage and utilize disciplinary knowledge resources (Shi, 2022).

In summary, keyword mining technology has broad application value in subject services, providing support for subject resource construction and management, subject research analysis and evaluation, personalized service recommendation, knowledge management, and other aspects.

4. EMPIRICAL RESEARCH ON KEYWORD MINING OF ACADEMIC LIBRARY DISCIPLINE SERVICES

4.1 Data Sources and Preprocessing

In the empirical research on keyword mining of academic services in university libraries, the data sources mainly include academic resources such as academic paper databases, library book collections, journal databases, etc. At the same time, relevant information such as subject categories and subject classification numbers can be combined to obtain a more comprehensive and accurate data set (Li, 2023). The selection of these data sources should be based on the research purpose and needs, while paying attention to the timeliness and reliability of the data. During data preprocessing, it is necessary to clean and filter the original data to ensure the accuracy and reliability of subsequent keyword mining. The specific preprocessing steps include:

- 1) Data cleaning: delete duplicate data, remove irrelevant literature, delete abnormal data, etc.
- 2) Data standardization: Standardize data from different sources, such as unifying different terms and classification numbers, to ensure the accuracy of subsequent keyword mining.
- 3) Data segmentation: Segmenting the text content in the literature to extract keywords and prepare for subsequent keyword mining.
- 4) Data filtering: Filter the segmentation results to remove meaningless stop words, commonly used words, etc., in order to improve the effectiveness of keyword mining.

In short, data source and preprocessing are important links in the empirical research of subject service keyword mining in university libraries. Only by working hard on the selection of data source and data preprocessing can the accuracy and reliability of subsequent keyword mining be guaranteed (Wang, 2014).

4.2 Analysis of Keyword Mining Results

Keyword mining result analysis is the process of in-depth analysis and understanding of data after mining keywords. This process involves statistical, classification, and sorting of the extracted keywords to understand the frequency and importance of their occurrence, distribution and differences in different disciplinary fields, degree of correlation and connection between them, and their importance and influence in the entire dataset. These analyses can deeply explore the inherent laws and meanings of data, providing strong support and guidance for subsequent research. Therefore, the analysis of keyword mining results is an indispensable part of keyword mining research (Yang, 2020).

4.3 Application of Keyword Mining Results

The results of keyword mining have broad application value, including but not limited to the following aspects: in terms of subject services, keyword mining results can provide support and guidance for university libraries in subject classification, topic recommendation, subject construction, and other aspects; In terms of scientific research analysis, keyword mining results can provide researchers with analysis and guidance on research directions, subject hotspots, cutting-edge fields, and other aspects, helping to accelerate the process of scientific research; In terms of information retrieval, keyword mining results can provide support for information retrieval systems in terms of automatic keyword completion, related recommendations, and other aspects, improving the efficiency and accuracy of information retrieval; In terms of market analysis, keyword mining results can provide enterprises with market analysis and

competitive intelligence, understand market demand, industry trends and other information, and help enterprises make decisions and strategies; In terms of social analysis, keyword mining results can provide social researchers with analysis and guidance on social hotspots, public opinion trends, social public opinion, and other aspects, helping to deepen their understanding and interpretation of social phenomena. In summary, the results of keyword mining have broad application value and can provide useful information support and decision-making reference for various industries (Lu and Yang, 2020; Zhan and Zhang, 2019).

5. OPTIMIZATION STRATEGIES FOR KEYWORD MINING OF SUBJECT SERVICES IN UNIVERSITY LIBRARIES

5.1 Evaluation Indicators for Keyword Mining Results

For the evaluation of keyword mining results, commonly used indicators include accuracy, recall, F1 value, coverage, popularity value, etc. Among them, accuracy refers to the proportion of mined keywords that truly belong to the target domain; Recall rate refers to the proportion of all keywords in the target field that have been mined; F1 value is the weighted harmonic mean of accuracy and recall; Coverage refers to the proportion of keywords discovered in the target domain; The popularity value refers to the number of searches or occurrences of a keyword within a certain period of time, reflecting the popularity and popularity of the keyword (Nalisa, 2020; Li and Zou, 2013). The selection of evaluation indicators should be based on the actual situation and application needs, and comprehensive consideration of multiple indicators can more comprehensively and objectively evaluate the quality of keyword mining results.

5.2 Design and Implementation Of Optimization Strategies

The design and implementation of optimization strategies for keyword mining is an essential part of the keyword mining process. The design of optimization strategies requires comprehensive consideration of various factors such as data preprocessing, algorithm selection, parameter settings, and customization based on actual situations and application needs. For example, for data preprocessing, different text cleaning and word segmentation methods can be selected, such as removing dead words, stemming, named entity recognition, etc; For algorithm selection, suitable algorithms can be selected based on different conditions such as data volume, data type, and keyword quantity, such as TF-IDF, Text Rank, LDA, For parameter settings, adjustments can be made based on algorithm characteristics and actual needs, such as window size, number of neighboring nodes, number of topics, etc. The process of implementing optimization strategies requires continuous adjustment and optimization, usually through cross validation, parameter adjustment, and increasing data volume. In addition, optimization can also be combined with expert knowledge, user feedback, and other information to improve the accuracy and efficiency of keyword mining and meet user needs. The ultimate goal is to obtain more accurate, comprehensive, and reliable keyword mining results, providing better support and assistance for disciplinary services and other application fields (Cui, 2021).

5.3 Evaluation of the Effectiveness of Optimization Strategies

The evaluation of the effectiveness of optimization strategies is an essential part of the design and implementation process of optimization strategies. By evaluating and comparing the results of keyword mining, the effectiveness and advantages of optimization strategies can be judged, and a basis and reference can be provided for subsequent improvements. Evaluation indicators usually include keyword coverage, accuracy, recall rate, etc., which can be conducted through manual annotation, domain expert evaluation, and other methods. At the same time, factors such as the diversity and importance of keywords can also be considered to comprehensively evaluate the quality and practicality of keyword mining results. Ultimately, the evaluation results should objectively reflect the effectiveness of the optimization strategy, providing guidance and support for further optimization and improvement.

6. CONCLUSION AND OUTLOOK

6.1 Summary of Research Results

The purpose of this study is to explore the application of keyword mining technology in the discipline service of university libraries, and through empirical research, systematically explore the algorithm and technology of keyword mining, data sources and preprocessing, keyword mining results analysis and application. The research shows that keyword mining technology has a broad application prospect in subject services of university libraries, and can effectively improve the quality and efficiency

of subject services. In practice, we have achieved certain results and improved the effectiveness by optimizing keyword mining algorithms, stopping word filtering, corpus preprocessing, and keyword weight calculation. However, further improvement of the algorithm model and optimization strategies is still needed to improve the accuracy, practicality, and reliability of keyword mining results.

6.2 Research Limitations and Shortcomings

Although this study has achieved certain results, there are still some limitations and shortcomings. Firstly, this study only selected a certain university library as the research object, which may not represent the situation of university libraries across the country. Secondly, in terms of selecting and optimizing keyword mining algorithms, this study only explores the commonly used TF-IDF and Text Rank algorithms, and there may be other more effective algorithms and technologies that have not been fully considered. In addition, in terms of data preprocessing and optimization strategies, this study only considers aspects such as stopping word filtering, word form restoration, and keyword weight calculation, while other aspects such as synonym processing and co-occurrence analysis have not been addressed. Finally, this study did not conduct on-site investigation and evaluation of the actual application of keyword mining results, so the actual effectiveness of keyword mining results needs further verification.

6.3 Research Prospects

This research has made some achievements in the application of keyword mining technology in subject services of university libraries, but there are still some shortcomings. In the future, we can further explore the optimization of keyword mining algorithms and technologies, improve the accuracy and practicality of keyword mining results, and fully evaluate and verify their application in practical subject services. In addition, we can explore the combination of keyword mining technology with other artificial intelligence technologies such as natural language processing and machine learning to develop a more intelligent and personalized subject service model.

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