

# Research on Cognitive Model of University Digital Library Information Retrieval Users

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**Abstract:** Emotion and cognition directly affect users' information behavior, so it is necessary to explore users' cognitive behavior characteristics. In order to provide more reliable information retrieval services for users, it is necessary for libraries to change the traditional information view, deeply analyze users' information retrieval needs, analyze users' retrieval behavior from the emotional and cognitive perspectives, establish a model of users' retrieval behavior, fully grasp users' personalized needs, and then formulate more scientific information retrieval service schemes. This paper expounds the information retrieval of university digital library, probes into the influence of users' cognitive factors on information retrieval based on the concrete analysis of the obstacles existing in the information retrieval process, and constructs a user cognitive model of university digital library information retrieval. Information retrieval is essentially a cognitive process. Grasping the characteristics of users' behaviors from the emotional and cognitive perspectives is helpful to explore the potential needs of users and formulate more scientific information service strategies.

## 1. Introduction

In the 21st century, mankind has fully entered the era of information society and knowledge economy. The growth and dissemination speed of information has reached an unprecedented level under the catalysis of Internet technology [1]. How to quickly and effectively find the required information in the ocean of information has become an important demand in people's daily life, and it is also the key to success in people's career. The rapid development of information technology has greatly improved the degree of informatization, rapidly improved the efficiency of information resource integration and organization, and increased the number of diversified and complex information resources [2]. The wide use of digital technology has created favorable conditions for university libraries to improve information retrieval efficiency according to user cognition [3]. In the era of mobile Internet, information sources are increasingly diversified, network service platforms emerge in endlessly, and the social circle of social individuals is expanding, creating a good environment for information retrieval, dissemination and sharing [4]. From the perspective of user cognition, exploring the information retrieval model matching with user thinking is a problem that should be paid attention to in the current university digital library. How to improve the information retrieval methods and build the user cognitive model of information retrieval in university digital library plays an important role in improving the information retrieval effect and optimizing the service quality of information retrieval [5].

With the popularization of information tools, people have improved the level of information utilization, and put forward higher requirements for information retrieval services. The traditional system centered retrieval method has been unable to meet the multi-level needs of users, prompting more scholars to pay attention to users' cognitive and emotional experience and try to combine cognitive science with information retrieval [6]. The development of cognitive science has changed the traditional information view of University Digital Library, and the information retrieval service has also changed to "user cognition leading" [7]. The traditional information retrieval model of university library also exposes many problems, such as the inability to scientifically define users' information retrieval objectives, the inability to accurately analyze users' retrieval habits and so on. In the virtual network environment, there are great differences between users' information retrieval

habits and psychological expectations, coupled with the dynamic changes of the information environment, which undoubtedly improves the difficulty of information retrieval [8]. Information retrieval is essentially a cognitive process. Grasping the characteristics of user behavior from the perspective of emotion and cognition is helpful to explore the potential needs of users and formulate more scientific information service strategies [9]. This paper expounds the information retrieval of University Digital Library, probes into the influence of user cognitive factors on information retrieval, and constructs the user cognitive model of University Digital Library Information Retrieval Based on the specific analysis of the obstacles existing in the process of information retrieval.

## **2. Characteristics of user information retrieval behavior in Internet Environment**

### **2.1. Dependent effect**

Information retrieval is a process in which users carry out a series of activities to meet the information needs with the help of specific retrieval tools. The information retrieval process involves many links, such as determining the target, selecting the retrieval system and formulating the strategy. Once people use a certain path or method, it is easy to generate dependence, and it will be strengthened in the future practice. In the process of information selection, users also have dependence on the tools and methods used in the past, or some previous experiences. When individuals feel stimulation, they will use the old knowledge to absorb new knowledge, that is, add information to the original cognitive structure, so that the cognitive structure can be enriched and expanded. In the process of information retrieval, people will be influenced by inherent thinking, become dependent on information retrieval tools and paths, and tend to the familiar information fields. This kind of dependence is a double-edged sword, which can improve the speed of users' information retrieval and make people quickly choose the required content, but it also limits users' retrieval thinking and makes users' adaptability to the information environment worse.

### **2.2. Irrational interference**

Under the internet environment, the digital information sources are extensive, the scale is constantly expanding, and the transmission carriers and retrieval channels are also constantly increasing. In the process of searching information, users often feel at a loss and have choice anxiety when facing massive resources. Under such conditions, even if users have clear goals, there may be a gap between the final choices and needs. Semantic memory is the foundation of the formation of users' cognitive structure. In people's memory, it is a collection of some concepts and relationships formed after the human brain recognizes things. The intricate network formed by these concepts and relationships is the semantic network. In the face of the complicated and changeable information environment, many users will have psychological and time pressure, especially if they are unfamiliar with the retrieval field, or the information processing is beyond their personal ability, or the quality of the acquired information is poor, which will directly interfere with their judgment on the retrieval information, leading to irrational emotions dominating.

### **2.3. First cause effect**

In the process of information retrieval, users are often more impressed with the information resources they first come into contact with, and this impression will affect their choice behavior. This is because the information presented at first is not interfered by the follow-up, and when new information is not inserted, it will not interfere with the user's thinking, so the probability of being finally selected by the user is relatively high. Users will also pay more attention to the retrieval tools and technologies they first come into contact with, or be willing to choose a more familiar way. The information retrieval process of users is the process of cognitive learning, and the ultimate goal of the retrieval process is to construct meaning [10]. During the whole retrieval process, users constantly adjust and enrich their own cognitive structure about retrieval topics through active meaning construction under the joint action of internal cognitive activities and external retrieval

behaviors. The first cause effect reflects the cognitive characteristics of users, that is, the content with more attention is more inclined. In the process of information retrieval, if the presentation of retrieval results is arranged according to the degree of relevance, the first cause effect will help to improve the accuracy of information selection, otherwise, this way of thinking will interfere with the objective judgment of users, leading to the loss of information presented later, which makes the information obtained by users not comprehensive enough.

### **3. User cognitive factors affecting information retrieval in University Digital Library**

#### **3.1. User cognitive ability**

User's cognitive ability is an important factor that affects cognitive information retrieval in university libraries. An individual's understanding and analysis of things' composition, internal relations and information expression is information cognitive ability. The difference of users' cognitive ability directly affects the selection of their retrieval tools and strategies. Research shows that, in the face of the same information retrieval task, users with strong scene dependence and users with strong independence have great differences in retrieval results. Individual cognitive ability reflects individual knowledge level and learning ability, including thinking, knowledge, reaction, understanding and other elements. Individual cognitive ability directly affects the information interaction between users and information retrieval system and retrieval environment. When faced with the specified retrieval database, users with strong independence can find more retrieval methods and carry out retrieval activities according to their own wishes, making the retrieval process more active and efficient. However, users with strong scene dependence are easily interfered by the outside world, have great dependence on retrieval tools, technologies, paths and so on, and are accustomed to the existing mode. Because each user has different perception of knowledge and information, there are significant differences in their thinking comprehension when using digital retrieval system. Driven by the personal knowledge structure, users' information demand caused by acquiring knowledge will affect their rational analysis of information resources and information retrieval methods, and then affect the information retrieval effect.

#### **3.2. User cognitive emotion**

The cognitive information retrieval of digital library has specific scenarios, and the retrieval scenarios contain different situational elements, which influence users' information retrieval behavior. People's emotions can be divided into positive and negative, and the change of emotions will affect people's cognitive process, and then affect people's behavior. In the process of information retrieval, users' emotion is an important factor affecting their behavior. The process of user information retrieval is also the process of interaction between users and situations and environments. The choice of users' information retrieval behavior is also determined by the retrieval situation, and users' cognitive emotion will affect users' information retrieval cognition in the retrieval process. When a person is in a good mood or mood, he is more willing to retrieve the required information content. In the selection of retrieval system tools, the cognition of retrieval system functions, the construction of retrieval expressions, etc., if users show positive emotions, the retrieval efficiency is relatively higher, and the satisfaction of retrieval results is also higher. When users use the information retrieval system of digital library, if they have positive cognitive and emotional experience, they can complete the retrieval task more efficiently. If negative psychology occurs, it is difficult to achieve good cognitive retrieval effect.

### **4. Guiding mechanism of library information retrieval behavior**

#### **4.1. Establish a good user-centered environment**

With abundant information resources, the library is an important place for users to acquire professional knowledge. With the increase of information channels under the Internet environment, information services are no longer limited by the natural environment, but realize digitalization and

ubiquity of services through the Internet of Things. University digital library should use data mining, semantic association and other technologies to label related data resources. On the basis of fully analyzing the structure and characteristics of digital resources in university library, it should build a resource database that meets users' cognitive needs. Whether the information retrieval is effective or not is determined by the interaction between users and the retrieval system. The influence of cognitive ability factors on information retrieval Cognitive ability refers to the ability of users' minds to optimize and integrate information resources, process and store information resources and apply innovation, which determines the effectiveness of information retrieval. Dynamic analysis of users' cognitive needs It is an important part of the construction of information retrieval system in university library to dynamically analyze users' cognitive needs and realize the dynamic management of users' needs. In the process of information collection, collation and subject classification of university digital library, the system needs to effectively collect and dynamically record the user demand information. To ensure the effective application of cognitive model, we must follow the normative principle in the process of building user cognitive model, which is the basis of building cognitive model, and it is mainly manifested in the coordination, unification and effective link of each specific process of information retrieval, so as to ensure that users can quickly and conveniently retrieve the information they need. The library data mining process is shown in Figure 1.

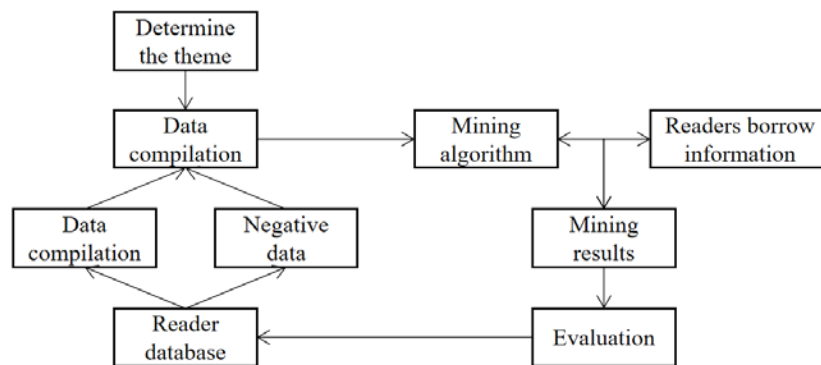


Figure 1 Library data mining process

In information retrieval, thinking ability affects users' cognition and understanding of retrieval tasks, and different users will have different cognition and understanding of the same retrieval task, which will determine the design of information retrieval strategies and the evaluation of information retrieval results to a certain extent. In the process of information retrieval, users' cognitive processing should be based on a certain knowledge structure, so users' knowledge structure will have a great influence on users' retrieval ability. In order to stimulate users' information retrieval behavior, it is necessary for libraries to create a good information service environment, bring them a pleasant experience and let them feel the value of library services. In terms of physical environment construction, it is required to ensure the rationality of the layout in the museum, and strive to make it neat, elegant and clean, so as to give users a good impression. Information retrieval needs the support of scientific and standardized knowledge structure, and knowledge structure is gradually supplemented and improved in information retrieval, which is a complementary process. If users have a scientific and standardized knowledge structure, they can accurately express their own information needs and make appropriate adjustments to the retrieval results.

#### 4.2. Create user information behavior guidance system

With the increasing scale of information resources under the Internet environment, information and knowledge play a more prominent role in people's lives, and more and more people realize the value of information utilization. The information service form of the library, which mainly provides literature resources, has been unable to meet the deep-seated information needs of users. Information is different from other products, and its carrier and mode of transmission are only auxiliary means. It is its proper meaning to explore the utilization value of information resources

and give full play to their actual utility. In the process of information retrieval, the knowledge structure and retrieval experience of different users are different, and their retrieval behavior will naturally be very different. In the process of effective information interaction between users and cognitive retrieval system, the library needs to analyze different kinds of user feedback information, aggregate and classify the user feedback results, and analyze users' cognitive needs and behavioral preferences in a specific time, so as to realize the dynamic management of users' cognitive needs. Cognitive model has certain stability, which will play a role for a long time, and it is not static. It may change according to the changes of users' needs and retrieval environment in the application process, so the construction of cognitive model must follow certain flexibility. On the basis of analyzing users' access time, log records and search hotspots, the library can establish feature vectors according to users' cognitive needs, and store the feature vectors in relevant databases in the form of corresponding topic sets for intelligent analysis by the system.

## **5. Conclusions**

The era of knowledge economy puts forward higher requirements for the construction of information retrieval system. Although the mainstream system-centered information retrieval algorithm is constantly improving, there are still some limitations in meeting the real needs of users. Based on the theory of cognitive constructivism, this paper puts forward an information retrieval model with dynamic, interactive and adaptable knowledge map as the core, focusing on promoting the two-way cognition between users and systems. The model can not only support the flexible interaction between users and the system in theory, help users better understand and identify requirements and develop cognition, but also support practical application research. The cognitive style and emotional factors of users will all affect the information retrieval behavior. In order to better meet users' information needs, libraries should grasp the characteristics of users' information retrieval behaviors, stimulate users' participation consciousness from the emotional and cognitive perspectives, and encourage and guide users' behaviors. University library needs to scientifically analyze users' retrieval behaviors and cognitive needs, determine users' cognitive information retrieval strategies, and on this basis help users to establish a perfect cognitive retrieval model, so as to guide users to complete retrieval tasks more efficiently and make retrieval results more scientific and accurate.

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