Design and Research of Private Book Sharing System Based on Sharing Economy Model

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Abstract. Based on the current situation, from the perspective of the sharing economy, it adds a lot of convenience to daily life. When accessing information or resources, the content that people want can be obtained quickly and easily through the Internet. At present, it has a great impact on the traditional private book system. The purpose of this paper is to study the design and research of the private library sharing system under the sharing economy in the current information age. The research method adopted in this paper is to first build a shared cloud platform, and build a private book platform by using RFID; CAN bus technology; network communication protocol and other research methods. Finally, the literature research method is used to understand the domestic plan for the construction of a private book function sharing system and the use of network surveys to analyze the resource utilization rate of domestic private libraries, which provides powerful data for the modern shared economy model of private book sharing systems. stand by. Experimental research results show that by creating a shared platform, more idle resources can be used more effectively to meet people's more diverse needs. In addition, the establishment of a shared platform helps to establish and improve the supervision and management mechanism.

Keywords: Sharing economy, Private books, Book sharing, Sharing system

1. Introduction

As the name suggests, the sharing economy is sharing[1]. Sharing your own personal belongings with others is called sharing. With the rapid development of today's society, the emergence of sharing economy has brought great convenience to people's production and life, which makes the service industry pay more attention to the improvement of efficiency[2]. Private books are an open place for people to consult, browse and obtain knowledge and information [3]. With the development of economy and the rapid development of Internet information technology, people have more and more
access to information resources. Computers, etc. can directly obtain the desired information, which is a function not yet available for libraries\cite{4}.

First of all, in a mobile environment, mobile library software should help users find the required information resources in an all-round way, make full use of the advantages of the library, give full play to the characteristics of large private book resources, and clearly inform users which resources in the library. Can borrow, what resources can not be borrowed, etc.\cite{5}. Secondly, when sharing information with multiple books for users, user information should be integrated to convert the resources that users can use into the data of each shared system, and strengthen the resource allocation of private books. Finally, the information resources required by users are split and reorganized to meet the diverse needs of users\cite{6,7}. In the context of the intertwined and complex information technology, private books use the close connection between the sharing economy and the sharing system, which is helpful to the construction of the service model of the sharing system and has achieved remarkable results\cite{8}.

At present, with the development of information technology, people require real-time and timely access to information resources, which makes the previous private book sharing model unable to effectively meet the needs of users\cite{9}. The construction of the private book sharing system is not as simple as traditional books. Mobile private libraries need to integrate the content of the information resource sharing platform. In order to maximize the role of mobile special books, in order to maximize the role of mobile private books, to meet the needs of users Various needs need to increase the depth of resource sharing, so that mobile libraries can better achieve the sharing of book information resources\cite{10}.

2. Method

2.1. Book recommendation of collaborative filtering algorithm

In order to make the system mentioned in this article have the function of recommending books for readers' personalities, a collaborative filtering algorithm is introduced. The basic idea of the algorithm is to recommend similar books for specific users based on books previously borrowed by other similar users.

The prediction is usually based on the weighted average of the recommendations of several people, not just on the most similar people. The weight of the rating given to a person is determined by the correlation between the person and the predictor. As a measure of correlation, the Pearson correlation coefficient can be used.

Calculate the correlation between X and \( Y_k X \) \( Y \), then you can give the correlation evaluation value calculation formula as follows:

\[
\text{r}(X, Y) = \frac{\sum_k (X_k - \bar{X})(Y_k - \bar{Y})}{\sqrt{\sum_k (X_k - \bar{X})^2 \sum_k (Y_k - \bar{Y})^2}} \tag{1}
\]

In this formula, \( k \) is the element of all items evaluated by both X and Y. Based on the rating of the person with the rating item i, the prediction calculation formula for the rating of the person X of the
book i is as follows:

\[ p(X_i) = \frac{\sum y_i - r(X,Y)}{n} \]  (2)

Where Y consists of all n individuals who rate the book i. The negative correlation can also be used as a weight. Then the prediction is made by calculating the weighted average of the deviation from the average of the neighbors. The calculation formula is as follows:

\[ p(X_i) = X + \frac{\sum (X_i - \bar{X})^2 - r(X,Y)}{\sum r(X,Y)} \]  (3)

If no one has rated book i, the prediction is equal to the average of all ratings X has made. The constrained Pearson metric is similar to the normal Pearson metric, but uses the average of possible rating values (in this case, the average is 4) instead of the average of the ratings of people X and Y.

2.2. Working Model of Private Book System Based on RoadFlow

First, determine the goal. The first thing that needs to be done is to determine exactly whether the results of the workflow are similar to those required by the system, whether it is a product, service or digital solution. In this way, clear goals can be created. Second, determine the parameters of the workflow. It is necessary to decide how to implement the workflow and determine the specific scope of the workflow. Finally, list all the steps that need to be taken to achieve the goal.

After creating a template for the project, please check each step in the process for redundancy and relevance. In order to make the workflow as efficient as possible, every step of the workflow should be effective and worthwhile. By checking all parts of the workflow before and after the project, you will be able to simplify the entire process and maximize efficiency.

3. Experiment

3.1. Experimental design

In order to verify the usability of collaborative filtering algorithm in book recommendation, this paper conducted related experiments. The experiment selected the browsing situation of the private book system in the central region as the data set, which contains reader information (age, name, region, etc.), book information (ISBN, title, author, publisher, etc.) and readers' score information on the book. On this data set, user-based collaborative filtering and item-based collaborative filtering methods were tested respectively, and the recommendation effects of the two were compared.

Then, through the literature reading method, with the help of the network and related resources of the library, a large number of literature materials are consulted to study the relevant theories of private book management innovation and sharing economy at home and abroad. Then the method of combining theory and practice, according to the actual situation of my work unit, the data mining theory is applied to the library's wonderful document management system, and the results of effective private book sharing system design are obtained.

3.2. Research object
In order to understand the design of the private book sharing system of the sharing economy model, 100 people in central China were selected for the experimental survey. A questionnaire was made on the design and use of the private book sharing system. A feedback survey was conducted on a user's use of the sharing system, and the survey data was integrated for statistical analysis. This time, a total of 100 questionnaires were distributed and 97 valid questionnaires were recovered. Among them, 3 questionnaires were invalid and the recovery rate was 97%.

4. Results

4.1. Questionnaire survey

| Options       | Choose the number of people | Percent |
|---------------|-----------------------------|---------|
| satisfaction  | 78                          | 78%     |
| general       | 12                          | 12%     |
| Quite satisfied | 4                           | 4%      |
| Dissatisfied  | 6                           | 6%      |

It can be seen from Table 1 that we conducted a questionnaire survey on one hundred students and combined the survey results in the options. It is not difficult to see that 78% of people are very satisfied with the private book sharing system. Because they believe that the private sharing system is formed under the rapid development of current computer technology, including the Internet of Things technology, big data technology and modern high-end computer application technology in Germany. About 52% of people think that the private book sharing system can greatly facilitate individuals to share the excellent books they read online in real time, which can improve efficiency. In Table 1, we can also see that 6% of people are dissatisfied, because they feel that an excellent online private shared book system is not very complete until now, and the safety factor is not high.

4.2. Implementation of the algorithm

The collaborative filtering algorithm for book recommendation can be roughly divided into two steps: 1. Calculate the similarity between books; 2. Query step. First, query the reader for similar items that are of interest to the reader, and the reader does not borrow the book of the record. Make recommendations. There are two types of neighborhood-based collaborative filtering algorithms: user-based collaborative filtering algorithms and item-based collaborative filtering algorithms. The two algorithms have their own advantages and disadvantages, and item-based is more suitable for the case where the number of recommended targets is much larger than the number of users, which is in line with the library book recommendation scenario.

It can be seen from Figure 1 that the average absolute error (MAE) value converges to a stable state after the number of neighborhoods is selected to 30. Since the book's bibliography is much larger than the number of reader users, the effect of selecting item-based collaborative filtering recommendation algorithm is superior. Based on the effect of user collaborative filtering algorithm.
4.3. The main problems of sharing economic resources

First, the awareness of economic resource sharing is weak. In the industrial age, affected by the expansion and aggression of capital, the ownership of resources was mainly "exclusive". However, the development of computer storage technology and information technology has made it possible for "resources" to be "replicated". This has made some cultural resources, etc., covered with the color of public services, from "exclusive" to "shared" development. However, due to the influence of traditional ideas, when evaluating private book sharing information, "the number of collection materials" is still regarded as the sole criterion for the level of private book sharing information. This lack of an overall evaluation standard makes the current private book sharing information in the process of co-building and sharing of resources, the sharing awareness is weak, the idea of self-centeredness is serious, the large private book sharing information pursues "big and complete", and small colleges and universities The pursuit of "small and comprehensive" in the concept of school books is the best manifestation of formalism, which is very unfavorable for the development of information resources sharing and co-construction of college libraries in the new situation and new era.

Second, the management system lags behind. At this stage, another important factor restricting the co-construction and sharing of private book sharing information resources is the management system. The lagging of the current private book sharing information management system is the main problem. In the overall planning of private book sharing information, the management system plays a comprehensive and coordinated role. The private book sharing information management system is the decisive factor in determining the scale, form, and benefit of the services ultimately provided by a library. The development of advanced private book-sharing information is inseparable from an advanced and effective management system that keeps pace with the times. However, the reality is that in the private book sharing information management system, there is always a contradiction between the overall cause and decentralized management, which greatly affects the service means and service model of information resource co-construction and sharing. Private book sharing information. Due to the lack of innovative rules and regulations, and the impact of the nature of private book sharing information, there is a lack of unified planning and leadership among libraries. Because there is no authoritative coordinating organization, resources among various private books are shared, resources are scattered and disordered, and collections are wasted repeatedly. On the one hand, private book
sharing information and documentation resources are idle; on the other hand, there is a shortage of effective information resources. This is an important manifestation of the lack of collaboration awareness among college libraries, poor resource sharing, and individualism. It is also a problem.

4.4. Advantages of private book sharing system

Provide convenient reading and guide the public to return to paper reading. With the advent of the 5G wave, the channels for citizens to acquire knowledge have gradually become fragmented reading. In 2018, the per capita reading of paper books and e-books were 4.66 and 3.12, respectively. Mobile phones and the Internet have become the main body of adult daily contact with the media. Nearly 40% of adult citizens believe that their reading volume is very small, and the voice of the country requiring local authorities to organize reading activities is very high. The private book sharing system provides citizens with an opportunity to read through fragmented paper books and an effective channel for book sharing. The private book sharing system circulates in the form of physical books. With the unique advantages of paper reading, it can make people better experience the culture and solid strength of the book, and meet the reading needs of readers as much as possible. Through book sharing, lead more young people to join the trend of paper reading. As a medium for the temporary transfer of book ownership, the automatic borrowing and returning of kiosks minimizes the tedious and lengthy intermediary links in the book circulation process for readers. Readers can find the location of the nearest kiosk and target book on the online APP to realize direct offline transactions.

The need to build a learning society for all and advocate reading for all will be the fifth time that “Reading for All” is written in the government work report in 2020. "Advocate reading for all and build a learning society" has become an important part of it. By vigorously promoting reading for all people, people can gain more happiness and satisfaction through reading, thereby enhancing cultural self-confidence. Since the report of the 18th National Congress of the Communist Party of China incorporated "Reading for All" into the national cultural development strategy, Reading for All has made historic breakthroughs and leapfrog development. The private book sharing system is a creative and concrete measure to implement the construction requirements of "learning society" and carry out "reading for all", aiming to improve the reading environment of the whole society and reduce reading costs.

4.5. Features of shared private book space based on mobile Internet

Easy to operate. Mobile Internet and its application terminals have the characteristics of wide coverage, high penetration rate, and convenience. The mobile terminal allows users to carry and connect to the Internet anytime, anywhere. When you need to reserve a shared space, readers can use mobile phones, tablets and other mobile devices to log in to the system to reserve, convenient, fast and easy to operate.

Timely interaction. Through the mobile Internet-based book sharing system, readers can timely query various real-time information published in the reservation system, and can enjoy various information services provided by the reservation system in a timely manner. The appearance of the reservation system not only improves the efficiency of the library, but also ensures that readers can make appointments in time, helping readers save a lot of time.
Economical and practical. With the development of the mobile Internet, the private book system can use the existing mobile network when building its own mobile service platform to save the cost of establishing a mobile network. At the same time, with the gradual improvement of mobile network construction and fierce competition between mobile operators, the cost of mobile network communication will become lower and lower, so the cost of readers to log in to the mobile service platform will also be reduced, which provides economic and practical possibilities Development of a private book sharing space reservation system for mobile Internet.

5. Conclusion

In the context of the rapid development of the sharing economy system in China, private shared books take "Internet + books" as the core, and the book reading under the connection of Internet big data technology realizes the temporary transfer of book use rights and effectively improves the whole society. The reading environment has greatly reduced reading costs, changed the status quo of Chinese people who have fewer books, expensive books, and inconvenience in borrowing and returning books. Private books that use digital sharing systems can not only enrich collection resources, but also achieve resource and information sharing, and improve private books. Business efficiency and better serve readers. However, most private book sharing systems have the disadvantages of insufficient facility construction, scattered resource allocation, low safety factor, large maintenance workload and personalized service limitations. In summary, in the process of continuous deepening of reforms in the design of private book sharing systems and the continuous improvement of service levels, affected by the development of information technology, it is necessary for relevant practitioners to learn the "sharing economy" in practice in order to obtain inspiration To implement the essence of the "sharing economy".

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