

Assessing the Need and Possibility of Using Recommender Systems in University Libraries

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Abstract— Despite the growing number of scientific and technical information sources, traditional library search systems cannot fully meet the dynamically changing needs of users. Therefore, the implementation of personalized user-oriented services has become one of the main tasks of modern libraries. Recommender systems can be used in academic libraries not only to provide information resources that meet the interests and needs of users, but also to replenish the library collection with relevant sources of information. However, in practice, the creation of a recommender system for academic libraries requires taking into account the features of the library infrastructure and information resources, as well as its users. The purpose of the article is to analyze the need and possibilities of creating recommender systems in academic libraries based on the results of a survey conducted among the faculty and students of universities in Uzbekistan. Based on the results of the analysis, the authors developed recommendations for the creation of recommender systems in the context of the transformation of academic libraries in Uzbekistan. These recommendations can serve as important information for decision-making by university and library administrators, developers and researchers in this field who seek to improve user-oriented services in academic libraries.

Keywords— *Library Resource Discovery, Personalized Suggestions, Recommendation System, University Library, User Behavior Analysis.*

I. INTRODUCTION

University libraries are often equipped with advanced IT infrastructure, which allows them to collect and store large amounts of usage data. Compared with public libraries, university libraries have two unique characteristics: they have extensive collections of specialized scientific materials, especially in science and engineering, and their users usually have extensive experience in their respective fields. At the same time, the rapid growth of knowledge has led to a constant expansion of library collections.

A recommender system is a tool designed to provide users with suggestions tailored to their needs or requests. Its main task is to predict resources that are suitable for users' needs by analyzing the history of their use, profiles and interactions, including the queries, searches and content created or expressed. Since the emergence of the Internet, its rapid growth and development have created many opportunities for users to share knowledge, information and ideas. This evolution has had a significant impact on the development of social networks and commercial platforms such as Facebook and Amazon. Today, these advances allow authors to share their innovative ideas with millions of users worldwide.

Traditionally, search engines have been the primary means of finding resources or books in library collections. However, this process often involves iteratively entering

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keywords to refine search results. A user who is skilled at formulating precise queries, especially those that are tailored to the preferences of the search engine, is more likely to achieve their goals easily. Despite the system's ability to track borrowing records-to determine which users have used which books at specific times-the knowledge gained from individual users' choices rarely benefits other users with similar needs. Thus, relying on traditional search engines may not be sufficient for users to effectively find the materials they need. This limitation highlights the need for a more intelligent recommendation system that can take advantage of user interactions and preferences.

A systematic approach was used to collect data on user preferences and usage patterns, allowing for an evidence-based assessment of their needs. The study includes a review of the survey results to identify key insights and contributions to the field. These results inform the need, requirements, and implementation strategies for integrating recommendation systems into academic library infrastructures. The focus is on developing a solution that is consistent with user-centered principles, offers optimized resource discovery, and enhances user satisfaction. Taking into account the unique requirements of the university library environment, this study contributes to the broader debate on improving the efficiency of library services through technological innovation. The proposed system of recommendations aims to bridge the gap between library resources and users, ensure efficient use of resources, and provide a superior library experience.

The growing interest in integrating recommender systems into university libraries has led to a wide range of studies examining their development, implementation, and impact on user satisfaction. Some studies provide a basic understanding of how open-source platforms can offer cost-effective solutions, especially for smaller institutions [1]. Others demonstrate the technical evolution of recommender systems by using advanced machine learning algorithms to optimize recommendations for larger and more diverse collections [2]. The importance of localization has been emphasized, and systems have been adapted to specific cultural and institutional contexts to enhance user engagement [3]. Hybrid approaches that combine collaborative filtering and content-based methods have also been explored to serve a broader and more diverse user base [4]. Systematic reviews provide insights into the general trends, challenges, and future directions of educational recommender systems. These reviews identify shortcomings in existing systems and highlight opportunities for adapting technological developments to academic needs [5], [6]. Metadata analysis has been investigated for its potential to improve academic outcomes through personalized recommendations [7]. Furthermore, studies highlight the role of user satisfaction and feedback mechanisms in informing iterative system improvements [8], [9]. A data-driven approach using historical lending data has proven effective in increasing the visibility and accessibility of resources within libraries [10]. Furthermore, studies have identified challenges and

proposed strategies to overcome the limitations of existing systems [11]. Future library services are expected to move towards the integration of intelligent technologies such as recommendation systems, which will enhance the importance of personalized and data-driven approaches in modern academic libraries [12]. Taken together, these studies provide a holistic perspective on the field, encompassing the technical, user-centered, and strategic aspects of library recommendation systems. Some emphasize technical methodologies such as deep learning [2] or hybrid filtering approaches [4], while others focus on user engagement [8], [9] and systemic issues [6], [11]. The vision of integrating advanced technologies supports the feasibility and necessity of implementing recommender systems tailored to the specific needs of university libraries, bridging the gap between traditional resource management and effectively meeting modern user demands.

This study aims to assess the need and feasibility of introducing recommendation systems in university libraries by assessing the main criteria for evaluating scientific and educational databases.

II. MATERIALS AND METHODS

The study focuses on the level of awareness, accessibility, and frequency of use of library electronic databases among faculty members and students of the Tashkent University of Information Technologies named after Muhammad al-Khwarizmi.

To achieve these goals, the following research tasks were carried out:

- a) To study the level of awareness of electronic databases used for academic and research purposes at the university.
- b) To identify the main channels of information about electronic databases among students and faculty members.
- c) To determine the frequency and necessity of using electronic databases at the university.

The study used a survey methodology to collect relevant data. A structured questionnaire was designed to gather insights into users' experiences and perceptions of electronic databases in academic libraries. The survey covered aspects such as awareness, access, usage patterns, and potential interest in recommender systems for library resources. In this survey, bachelor's students, master's students, assistants, senior lecturers, associate professors, and professors participated, making up a total of 112 participants.

III. RESULTS AND DISCUSSION

University libraries are an integral part of modern education systems, providing access to important academic resources and knowledge for students and researchers. However, a persistent challenge is to effectively tailor library services to the specific needs and preferences of users. Addressing this challenge is particularly important to enhance digital transformation in education.

This study explores these challenges by analyzing data collected through user surveys to develop practical recommendations for implementing a personalized recommendation system in university libraries. An analysis conducted among students of the Tashkent University of Information Technologies named after Muhammad al-Khwarizmi provides key insights into user behaviors and requirements. Using these findings, the study aims to propose strategies that increase resource accessibility and improve the overall user experience in academic libraries.

A. Analysis of Survey Questions and Objectives

The survey questions were designed with the following objectives:

- **Understanding User Engagement with Library Services:**
 Question: "How often do you visit the library?"
 Objective: To measure the frequency of library visits and adjust service offerings accordingly.
- **Identifying Preferred Library Usage Modes:**
 Question: "Do you use a traditional library or an electronic library?"
 Objective: To evaluate the demand for digital resources and services.
- **Evaluating Feedback on Current Services:**
 Question: "Is the library search system user-friendly?"
 Objective: To identify areas for improvement in search functionalities.
- **Assessing Interest in Technological Enhancements:**
 Question: "Do you think recommendation systems like those on YouTube or Instagram are necessary for libraries?"
 Objective: To gauge interest in integrating personalized recommendation systems in library services.

B. Analysis of Results

The study results revealed the following trends:

Library Usage Frequency: 70.4% of respondents reported visiting the library more than once a week, indicating high engagement with library resources.

Digital Resource Adoption: 65% of respondents indicated a preference for electronic libraries, demonstrating a growing demand for digital solutions.

How often do you visit the library?

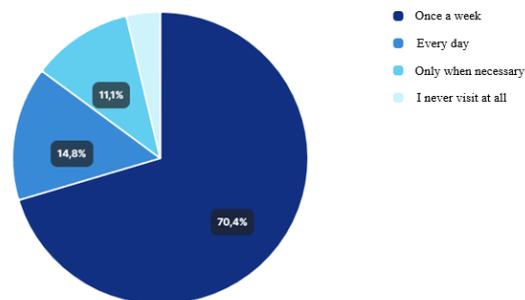


Fig. 1. Diagram of users' library visits.

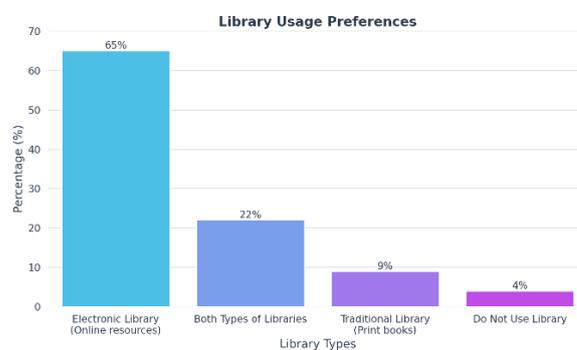


Fig. 2. Library usage preferences.

Search System Feedback: While 58% of users found the search system efficient, 30% identified areas for improvement, highlighting the need for an optimized user experience.

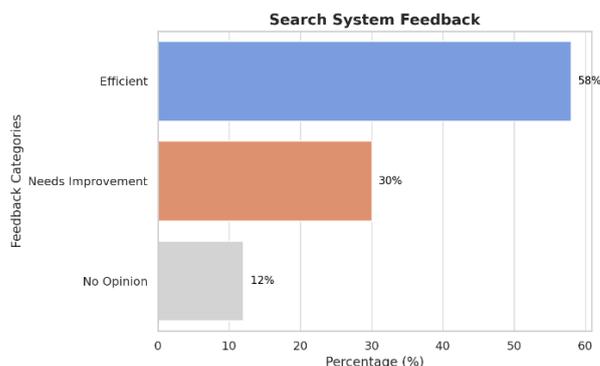


Fig. 3. Search system feedback data

Recommendation Systems: 78% of respondents believed that implementing recommendation systems would enhance library services by improving resource accessibility and personalization.

Developing a recommendation system for university libraries offers several advantages. It provides personalized services by tailoring recommendations based on user preferences and learning goals, thereby improving resource discovery. In addition, it improves search efficiency by automating the recommendation process, saving users time and effort in finding relevant materials.

The system also contributes to optimal resource utilization by providing visibility into underused resources through targeted recommendations. Furthermore, the integration of advanced technologies such as artificial intelligence and machine learning allows libraries to offer modern services that are in line with current technological trends, enhancing the overall user experience and academic engagement.

Below is a summary of survey responses:

TABLE 1 SUMMARY OF SURVEY RESPONSES

Question	Responses		
	Yes (%)	No (%)	Undecided (%)
Is a recommendation system needed?	78	15	7
Do you use electronic libraries?	65	25	10

The review findings indicate a strong demand for recommendation systems in university libraries. Such systems can enhance user experience, optimize service delivery, and support academic goals by providing personalized, efficient, and technology-driven solutions.

Surveys play an important role in shaping services by providing insights directly from users. For university libraries, a study that focuses on user preferences, technological needs, and service performance provides an opportunity to adapt offerings to the evolving academic and technological landscape. The analysis under consideration provides important information that informs strategies that can be implemented to improve library performance and user satisfaction.

University libraries benefit significantly from data-driven decision-making, as empirical evidence helps administrators optimize services based on user behavior. For example, 70.4 % of respondents believe that understanding library traffic can help better allocate services during peak hours, while 65 % say that a preference for electronic resources is a necessity to invest in digital infrastructure. Improved user experience is another benefit, as 30 % of users who identified inefficiencies in their search engine will guide necessary technical updates, ensuring libraries address specific pain points such as search inefficiencies or limited access to relevant resources. In addition, the integration of emerging technologies is made possible by strong user support, with 78 % of respondents expressing interest in AI-based recommender systems. This readiness allows libraries to prioritize technological improvements that personalize the user experience and help them find resources more efficiently. In addition, better utilization of resources can be achieved through library surveys, which identify underutilized materials, allowing recommendation systems to promote these resources and more balanced distribution of library assets. Finally, aligning library services with institutional goals strengthens the university's commitment to scholarly achievement and

technological innovation by creating an environment conducive to research and learning.

Surveying university libraries is critical to understanding the changing needs of users, as academic environments are dynamic, influenced by technological advances and changing learning practices. Regular surveys ensure that library services are responsive to these shifts, and remain relevant and effective. In addition, surveys provide a competitive advantage by helping libraries keep pace with digital resources and online platforms such as YouTube and Instagram, identifying which features, such as recommendation systems, can improve their services and fill the gap. Cost-effectiveness is another important advantage, as survey results help institutions allocate resources more effectively, avoiding unnecessary investments in redundant services and directing funds to high-impact areas that users find valuable. Additionally, actively seeking user feedback increases engagement by demonstrating the library's responsiveness and building trust, which in turn encourages greater user participation and use of available resources.

The survey offers a foundation for university libraries to innovate and adapt in response to user needs. By leveraging the findings, libraries can enhance service delivery, integrate advanced technologies, and align their operations with modern academic requirements. This proactive approach ensures that libraries remain indispensable in the academic ecosystem.

IV. CONCLUSIONS

The study confirms that the integration of recommendation systems in university libraries is both necessary and feasible. In theory, these systems will contribute to the evolution of digital library science by improving personalized information retrieval models and improving resource discoverability. The findings are consistent with the existing literature on AI-driven library management and reinforce the importance of adaptive learning algorithms in academic settings.

From a practical perspective, the survey results highlight the growing demand for intelligent recommendation systems among students and faculty. The data suggest that universities in Uzbekistan can improve research efficiency and educational outcomes by implementing AI-based recommendation tools tailored to the needs of their users. These systems not only simplify access to academic resources, but also optimize library management through data-driven decision-making. Institutions should invest in regular needs assessments to adapt recommendation algorithms to changing academic needs. By leveraging advanced technologies, university libraries can move from traditional resource management models to dynamic, user-centered academic support systems.

The implementation of recommendation systems represents a strategic advance in library innovation, ensures long-term sustainability, and enhances academic engagement. Future research should focus on developing

localized AI-based solutions, addressing language and content diversity, and optimizing system performance for different academic disciplines.

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REFERENCES

- [1] K. Puritat, and K. Intawong, "Development of an Open Source Automated Library System with Book Recommendation System for Small Libraries." *Journal of Library Innovation*, 2022, pp. 45–60.
<http://dx.doi.org/10.1109/ECTIDAMTNCON48261.2020.9090753>
- [2] T. Xu, W. Xianqing and L. Tingting, "Research on Personalized Recommendation System of Library Collection Based on Deep Learning," *Digital Libraries Research*, 2022, pp. 78–90.
<http://dx.doi.org/10.1155/2022/3087623>
- [3] H. Zhang, Y. Xiao and Z. Bu, "Personalized Book Recommender System Based on Chinese Library Classification," *Library Systems and Services*, 2023, pp. 250–265.
<http://dx.doi.org/10.1109/WISA.2017.42>
- [4] T. Pan, "Personalized Recommendation Service in University Libraries Using Hybrid Collaborative Filtering Recommendation System," *Journal of Academic Libraries*, 2021, pp. 205–220.
- [5] N. Kamal, F. Sarkar, A. Rahman, S. Hossain and K. Mamun, "Recommender System in Academic Choices of Higher Education: A Systematic Review," *International Journal of Educational Technology*, 2021, pp. 120–135.
<http://dx.doi.org/10.1109/ACCESS.2024.3368058>
- [6] F. L. da Silva, B. K. Slodkowski, K. K. Araújo da Silva and S.C.Cazella, "A Systematic Literature Review on Educational Recommender Systems for Teaching and Learning: Research Trends, Limitations, and Opportunities," *Educational Technology Research and Development*, 202371(2),123–145.
<https://doi.org/10.1007/s10639-022-11341-9>
- [7] M. J. Holmes, "Recommender Systems in Higher Education: The Effectiveness of Meta-Data Analysis in Predicting Academic Success" *Higher Education Technology Journal*, 2022, pp. 35–50.
- [8] J. Miller, "Analysis of User Satisfaction of Academic Digital Library: An Empirical Model with Mediating Effects," *Journal of Information Systems in Education*, 2020, pp. 215–230.
<http://dx.doi.org/10.6007/IJARBS/v13-i12/20030>
- [9] R. Johnson, "Evaluating User Satisfaction with Digital Library Services: A Study of Academic Libraries in Higher Education Institutions," *Higher Education Digital Resources Journal*, 2022, pp. 90–110.
- [10] M. Garcia, "The Book Recommendation System Using Library Loan Records," *Library and Information Systems Journal*, 2021, pp. 55–72.
- [11] T. Brown, "Book Recommendation System: A Systematic Review and Research Issues," *International Journal of Library Science and Research*, 2020, pp. 120–138.
- [12] E. Thompson, "The Future of Libraries: Adapting to User Needs," *Library Management Review*, 2021, pp. 12–28.