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Summer 5-28-2023

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Recommended Citation
Wan, Jiangping; Lin, Siting; and Zhang, Jing, "Bibliometric Analysis on the Research Hotspots of Recommender Systems" (2023). *WHICEB 2023 Proceedings* . 12.
https://aisel.aisnet.org/whiceb2023/12

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Bibliometric Analysis on the Research Hotspots of Recommender Systems

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1. INTRODUCTION AND RESEARCH QUESTIONS

As an effective way to solve the problem of information overload, recommendation systems are widely used in video, e-commerce and other fields. In recent years, research in this field has been in full swing. The recommendation system can model the user's interest by analyzing the user's historical behavior, and then actively recommend information that can meet the user's interest and needs to the user. Its essence is to connect the user and the product in some way [1]. There are explicit and implicit requirements for users [2]. Explicit requirements can be explicitly expressed in some way (such as keywords, natural language description, etc.), and this requirement can be met through search engine technology [1]. But many times, it is difficult to accurately express the needs of users. The birth of recommendation system is to solve this problem. That is, on the basis of understanding the implicit needs of users, provide personalized recommendation services for users.

In recent years, the number of documents related to recommendation systems has increased rapidly. Many scholars have reviewed and analyzed recommendation systems, but they have simply classified them and introduced their principles. There are few systematic studies on the research hotspots and trends of recommendation systems. In view of the large number of documents, the visual analysis tool CiteSpace can display the research hotspots, frontiers and development trends of the discipline in a certain period of time through the quantitative research of documents in a specific discipline field, and clearly show the overall picture of a certain discipline field [3]. Therefore, this paper selects a total of 867 SCI and SSCI documents related to personalized recommendation technology from the Web of Science database from 2013 to July 2022, and uses CiteSpace to conduct a quantitative analysis of the relevant documents related to personalized recommendation technology from multiple dimensions, to explore the research hotspots, foreword and development trend.

2. THEORY AND RESEARCH FRAMEWORK

This paper gives the definition of recommendation system in this paper on the basis of summarizing the existing literature, and describes the recommendation technology in different scenarios to illustrate the rationality and universality of the definition. In addition, this paper uses the visual knowledge map analysis tool CiteSpace to analyze the temporal and spatial distribution characteristics, knowledge base, research hotspots and frontiers of the research related to the recommendation system from the five dimensions of document growth trend, regional distribution, document co-citation relationship, keyword co-occurrence and emergence. The research framework is shown in Figure 1:

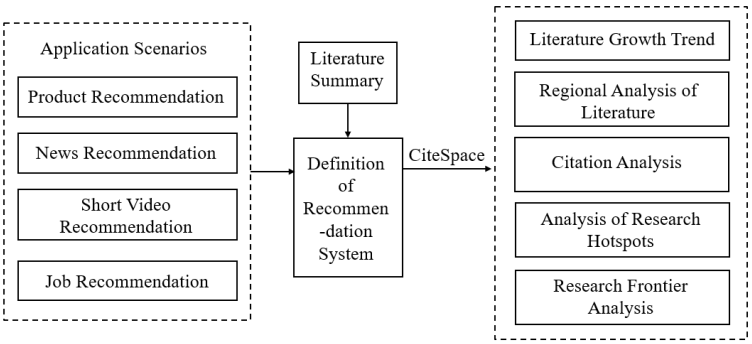

Figure 1. Research framework

3. RESULTS AND FINDINGS

Firstly, this paper gives the definition of recommender system as follows: it explores and understands the implicit needs of users from user behavior data through user profiling, model and algorithm, and provides personalized recommendation service: that is, contact users and items to solve the problem of information overload.

Secondly, through the statistical analysis of the literature, it is found that the number of papers in the field of personalized recommendation has increased exponentially in the past ten years, indicating that this field has attracted more and more attention from the academic community and has become the current research hotspot [4]. CiteSpace is used for bibliometric analysis, and the following conclusions are drawn: (1) The geographical analysis of the literature shows that China and the United States are in the leading position in the field of recommendation systems, and China's scientific research cooperation with other countries is very close, which plays a bridge role in the research. (2) The four highly cited literatures found in the citation analysis show that matrix decomposition technology, similarity calculation, hybrid recommendation algorithm, and the influence of time factors are the basis and focus of research in this field. (3) The results of keyword frequency analysis show that the current research hotspots in this field include: the construction of recommendation systems, the research of collaborative filtering, the construction of models, social networks, and neural networks. (4) Keyword emergence analysis found that feature extraction, machine learning and attention mechanism are three topics that are relatively active at present and may become a research hotspot in the future.

Finally, this paper predicts the future development direction of recommendation system research: (1) In the research of collaborative filtering algorithm, how to promote matrix decomposition to use multi-layer perceptron to learn the interaction function of users' items, how to calculate the similarity of each user with a small score, and how to make recommendations deserve further discussion. (2) The application of in-depth learning in the recommendation system will flourish in the future,. It is necessary to carry out in-depth interdisciplinary research to understand the impact of information overload and information "bias" on people and society in a more in-depth way, and fully consider the user's subjective interests and preferences. (3)In our understanding, we should strengthen the connection between academic research and industry practice, and jointly establish a standardized evaluation system of recommendation system in view of the gap between academic research and industry implementation.

4. CONTRIBUTIONS

This paper redefines the recommendation system, which is reasonable and universal. This paper uses CiteSpace to carry out regional analysis, citation analysis, keyword frequency analysis and keyword emergence analysis of the literature in the past 10 years, systematically expounds the research hotspots and trends, clearly presents the overall picture of the subject field, and plays a role in knowledge enhancement for the theoretical research of recommendation systems. In addition, this paper also describes the current research situation in this field, puts forward the possible future direction in view of the existing problems, and calls on the academic community to strengthen cooperation with the industry, strengthen the connection between academic research and industry practice, and jointly establish a standardized evaluation system of recommendation systems, so as to promote the development of research in the field of recommendation systems.

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