Visualization and analysis based on Cite Space domestic feedback information recommendation application research

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Abstract This study used Cite Space to analyse the domestic literature on feedback recommendation applications between 2003 and 2023. It is found that domestic scholars have conducted in-depth research in the areas of recommender systems, collaborative filtering, and implicit feedback, focusing on hotspots such as deep learning, matrix decomposition, and user feedback. Although the existing research focuses on improving the efficiency of information access and user satisfaction, the in-depth research on multi-source feedback integration methods still faces challenges. Future research can leverage new technologies such as deep learning to mine more user behaviour data and achieve more accurate personalized recommendations.

1. INTRODUCTION

The term "feedback" first originated in the field of system engineering in the early 20th century, and is used to describe the self-regulation mechanism in a system[1]. The more information contained in the feedback, the better the effect. As a specific form of feedback, feedback information is of great significance for the continuous improvement and regulation of the system, which attracts many scholars to conduct extensive research on it, for example, Chen Yumin et al. proposed a method of recommending academic papers by combining textual and implicit feedback information[2], etc. Current scholars explore feedback recommendation without a clear definition. Limited reviews on its application prompt this study, utilizing Cite Space for a systematic analysis of domestic feedback recommendation research.

2.LITERATURE SOURCES AND RESEARCH TOOLS

2.1.Literature sources and processing

The data of this study were obtained from the full-text database of China Knowledge Network (CNKI), in order to ensure the comprehensiveness and reliability of the original data, the advanced search was selected in China Knowledge Network (CNKI), and the search condition was set to be journal search, subject = (feedback AND recommendation) OR (feedback information AND recommendation), time span = 2003-2023, and search condition = precise. A total of 235 documents were retrieved. After eliminating non-research based literature such as duplicates, conference announcements, etc., a total of 280 valid documents were obtained.

2.2.Analytical methods and tools

Cite Space is a citation visualization and analysis software tool that focuses on analysing the underlying knowledge contained in scientific analyses and has evolved in the context of scient metrics and data visualization[3]. The four nodes of Cite Space can satisfy four kinds of analytical purposes: i) Collaborative network analysis among authors, institutions, or countries; ii) Topic, co-occurrence analysis of keywords or Woos classification; three, co-citation analysis of literature, authors, and journals; and four, literature coupling analysis[4]. In this study, the first two node types are mainly used to analyze the literature retrieved from the CNKI database for the recommended application of feedback in a time-shared dynamic coursed-based mapping.

3. TIME-DISTRIBUTION MAPPING

3.1. Temporal Distribution Mapping

The annual publication count serves as a key indicator of feedback recommendation research trends. As shown in Figure 1, from 2003 to 2014, the number of publications remained stable, staying below 10 per year. It gradually increased from 2015 to 2020, exceeding 15 papers annually. However, from 2020 to 2022, the count decreased from 31 to 19. Remarkably, in 2023, there was a rapid surge to 42, reaching the highest point in the past two decades, indicating significant research interest in feedback recommendation applications.

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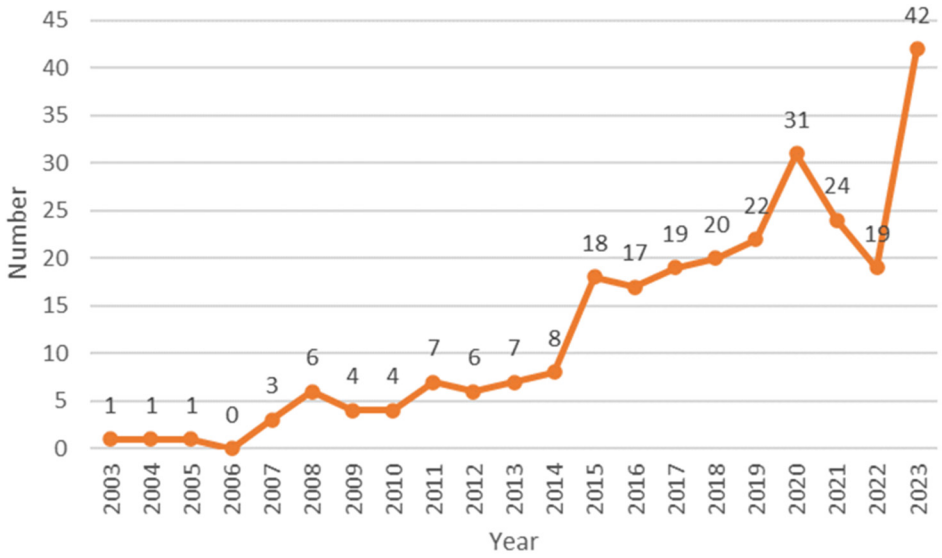

Figure 1 Trends in the number of publications

3.2. Spatial Distribution Mapping

3.2.1 Author Distribution

Re-examining the number of nodes in the authors' co-occurring knowledge graph is 234, the number of connections is 148, and the density is 0.0054, it can be found that the whole network of the knowledge graph presents a structure of small-scale concentration and large-scale decentralization, which suggests that the authors in the field of applied research on feedback recommendation are all collaborating on a small scale. The number of authors' publications and collaboration networks are often key indicators for assessing authors' influence and research activity. As shown in Table 1, 2008 was the year with the highest number of publications, with a total of four authors publishing four papers each, indicating the research fervor in the field in that year. This is closely followed by 2016 and 2021, with three papers published each year, indicating a relatively high level of interest among researchers during these years. However, most authors in this field publish relatively infrequently, with most authors having only one or two publications.

Table 1 Top Ten high-yielding authors

ID	Author	Year	Quantity
1	Chu Raijin	2008	4
2	Yu Zhen	2008	4
3	Zheng Xianfeng	2008	4
4	Wang Shao Jie	2008	4
5	Liu Xuejian	2016	3
6	Pan Weike	2021	3
7	Ming Zhong	2021	3
8	Wu Bin	2019	2
9	Li Xiaoyun	2009	2
10	Wang Jinlin	2012	2

3.2.2 Institutional Distribution

In the realm of cross-institutional research, this study involves 185 institutions. The resulting knowledge graph exhibits 71 connections with a density of 0.0042, indicating a fragmented institutional distribution without clear clustering. Few institutions, such as Beijing Jiao tong University's School of Computer and Information Technology and the National Network New Media Engineering Technology Research Center of the Chinese Academy of Sciences' Institute of Acoustics, have established cooperative relationships. This reflects the independent nature of feedback recommendation research; despite academic attention, there's a lack of collaboration consciousness among researchers and institutions. Knowledge and research results sharing and mobility are limited.

4.HOT TOPICS

Keyword clustering analysis is a method for organizing and classifying similar topics or concepts in the research literature. The clustering view can show the distribution

of research areas from multiple perspectives[5], and the keyword clustering knowledge map obtained by Cite Space software (see Figure 2).

These clusters refract the current status of hot issues in the research of feedback recommendation applications, including collaborative filtering、recommendation system、recommender system et al. (and others)10 main clustering labels of recommender systems.

By analyzing the clustered graphs for emergent words, nine node emergent words with high emergent values are obtained (as shown in Figure 3). Through keyword clustering and keyword highlighting analysis, the research content and development trend of the feedback recommendation application are summarized as follows:

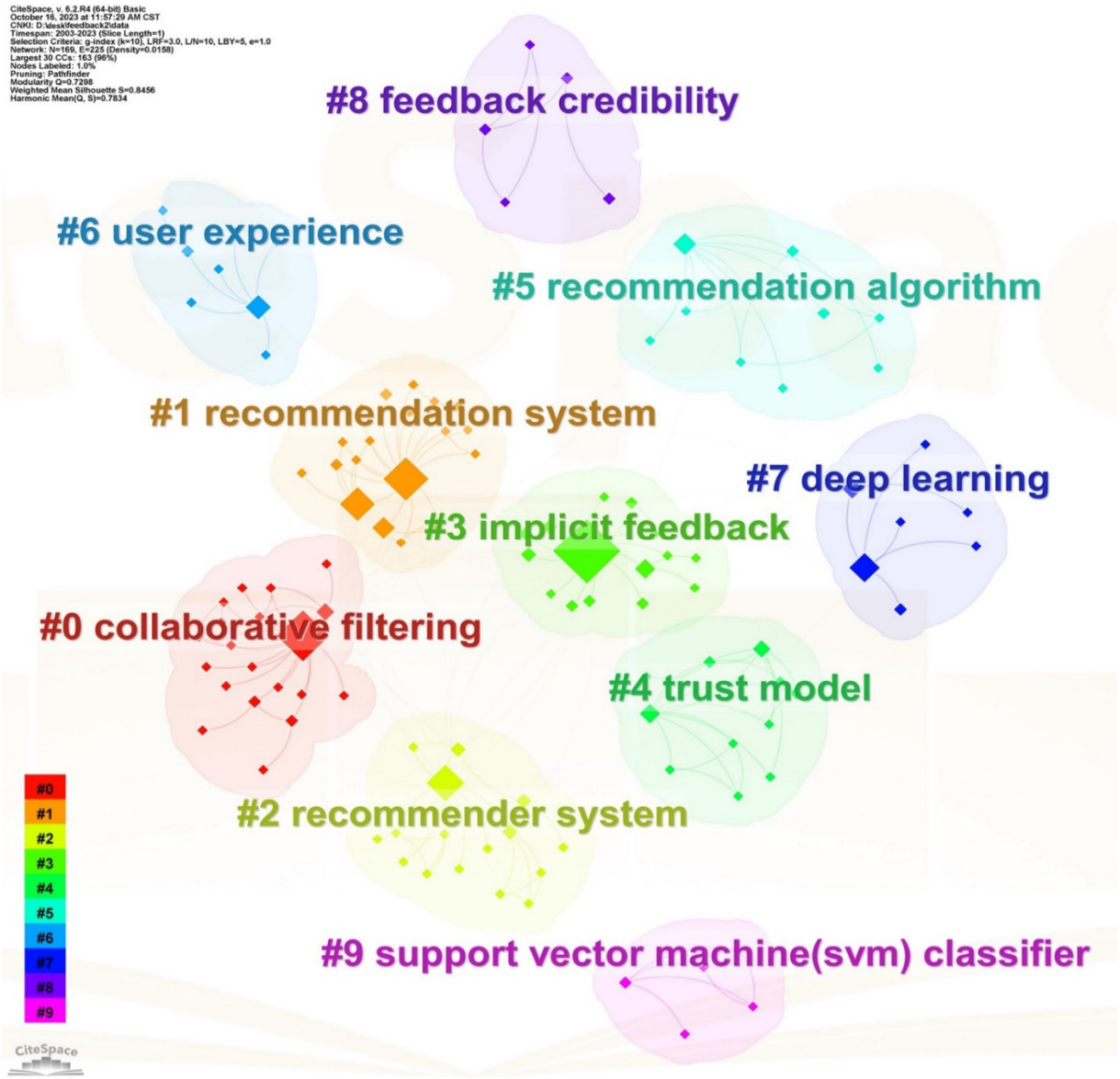

Figure 2 clustered co-occurrence knowledge graph

Recommender Algorithms and Personalized Recommendation : Current research on recommender systems focuses on improving the quality of personalized recommendations and user satisfaction, focusing on factors such as trust relationship, fuzzy semantics, adaptive and implicit feedback to improve the degree of personalization of recommender systems, and also focusing on collaborative filtering algorithms, intelligent recommendations, display feedback and weighting to improve the collaborative filtering effect of the recommender system and the feedback mechanism to ensure the accuracy of the recommendation results. The following are some of the factors that can be used to improve the degree of personalization of the recommendation system.

Implicit Feedback Data Mining and Deep Learning: In the research of recommender systems, implicit feedback data mining and deep learning research have attracted much attention. Recommendation algorithms, tensor decomposition and deep learning techniques are used to mine the user behavior patterns behind implicit feedback so as to improve the prediction accuracy of recommendation systems. The introduction of deep learning techniques enables recommender systems to

better handle large-scale and complex implicit feedback data, thus improving the effectiveness of recommendation algorithms. Research in this field provides strong technical support for the development of recommender systems and paves the way for providing more intelligent and personalized recommendation services.

Figure 3 Top 10 Keywords with the Strongest Citation Bursts

Recommender system with trust model for peer-to-peer networks: In peer-to-peer networks, recommender systems are vital, offering personalized recommendations in file sharing, instant messaging, and resource platforms. Trust models like direct, indirect, and user evaluation-based trust, along with certificate authority trust, enhance recommendation reliability. These models establish a robust trust system, ensuring trustworthy recommendations, enhancing network security, and user experience in decentralized environments.

Research on Cold Start Problem and Emerging Application Areas: The cold start challenge in recommender systems involves user and item cold starts. Researchers use methods like clustering to recommend based on user behavior patterns, overcoming sparse data issues. Robust algorithms, including content-based and deep learning, address data scarcity. Recommender systems find use in emerging fields like agriculture, diversifying their applications.

5.SUMMARY AND OUTLOOK

Feedback information is pivotal in recommender systems, drawing extensive research interest. Current efforts focus on enhancing information acquisition efficiency and user satisfaction. Integrating feedback from diverse sources remains challenging. Future research must leverage technologies like deep learning for precise personalization. Addressing privacy and ethics is crucial. Researchers should reinforce privacy safeguards while delivering tailored services. Future directions include multi-source feedback integration, deep learning applications, and ethical privacy balance, driving recommender systems' advancement.

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