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Blended Teaching Mode Model of College English Based on Collaborative Filtering Recommendation Algorithm



Abstract: - The incorporation of collaborative filtering recommendation algorithms into blended teaching approaches for college English marks a big step forward in language education. This study investigates the theoretical underpinnings, practical ramifications, and pedagogical issues for adding collaborative filtering algorithms into blended learning environments. Collaborative filtering algorithms produce individualized learning resource recommendations based on user interactions and preferences, increasing student engagement and motivation. However, issues like as data privacy, algorithmic biases, and user approval must be addressed to ensure that collaborative filtering is implemented effectively in the classroom. This study explains the potential of collaborative filtering recommendation algorithms to improve language learning results in college English courses by doing a thorough literature review. It also provides ideas for educators and policymakers on how to handle the complexity of incorporating collaborative filtering recommendation algorithms into blended learning models. Finally, this paper adds to the promotion of novel pedagogical approaches and the improvement of language learning experiences among college students. As a result, the enhanced collaborative filtering recommendation system had a slightly greater recall rate and precision than the pre-optimized method.

Keywords: Collaborative Filtering Recommendation method, Collaborative filtering method, Blended Learning.

I. INTRODUCTION

Blended learning models have emerged as transformative ways in higher education, providing a seamless blend of traditional face-to-face lectures and online learning settings. In the field of language education, particularly collegiate English classes, the use of blended teaching approaches offers potential opportunities to improve student involvement, interaction, and learning outcomes [1]. This introduction digs into the design of a blended teaching paradigm for college English, highlighting the incorporation of a collaborative filtering recommendation system [2].

Blended learning uses the strengths of both traditional classroom instruction and digital tools to create dynamic and adaptable learning environments. Using online platforms, multimedia resources, and interactive activities, instructors can personalize lessons, adapt to different learning styles, and provide students with chances for self-directed learning [3]. In the context of collegiate English education, where language competency is critical, a blended teaching paradigm has enormous potential for promoting language learning, communicative competence, and cultural literacy [4].

The integration of recommendation algorithms, particularly collaborative filtering, is critical to the effectiveness of a blended education paradigm [5]. Collaborative filtering algorithms leverage user preferences, behaviours, and comments to make individualized recommendations for learning resources like reading materials, multimedia content, and language practice exercises. Using the power of collaborative filtering, instructors may create individualised learning routes for students that match their specific needs, interests, and competence levels [6].

This study investigates the theoretical foundations, design principles, and pedagogical implications of a blended teaching paradigm for college English, which is supported by collaborative filtering recommendation algorithms. This study seeks to reveal the potential of blended learning in maximising language teaching and aiding student performance in college English courses by conducting a thorough analysis of existing literature, empirical research, and practical insights [7].

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In subsequent sections, the paper will delve into the theoretical foundation that guided the development of the blended teaching model, address implementation techniques, examine the integration of collaborative filtering recommendation algorithms, and offer empirical study findings. By providing light on the junction of blended learning and collaborative filtering in college English teaching, this study aims to advance new pedagogical techniques and improve students' language learning experiences.

II. LITERATURE SURVEY

Blended teaching incorporates the benefits of both online and conventional learning methods [8]. Integrating these two teaching techniques allows learners to progress from basic to advanced knowledge, making it a popular research topic in education reform. Blended teaching encourages diversity and allows learners to freely express their views, share resources, and engage in discussions. Scholars are exploring scientific methods to enhance the effectiveness of blended learning [9].

Akcaoglu et al. [10] suggest that teachers prioritize the social interaction of online learners by forming small, permanent discussion groups. Online learning designers and educators can intentionally adjust group size to enhance social presence in asynchronous discussions.

Lee et al. [11] proposed integrating online and offline instruction with interactive tools in an intelligent classroom setting. This has been demonstrated by guiding students to self-study, providing timely feedback, encouraging active participation in educational activities, and fostering successful and in-depth interactions between teachers and students.

According to Hébert et al. [12], creating a mobile learning environment with formative evaluation on an online study platform can improve students' interest, attitude, and performance.

In the work of Hwang et al. [13], intelligent classroom-based blended teaching can facilitate teacher creativity. Teachers can monitor student's learning progress in real-time and promote offline learning by encouraging reporting and peer review.

Auster et al. [14] implemented blended learning through online screencasts for sociology courses in colleges. Screencasts were utilized in education to introduce topics and theories, allowing for greater discussion and review outside of class time. Research indicates that screencasts improve student achievement [15]. Blended teaching can enhance student engagement, motivation, and teacher-student interactions. Exploring the use of blended teaching to enhance teaching effectiveness is a key strategy for reforming education.

III. METHODOLOGY

A. Collaborative Filtering Algorithm

Collaborative filtering recommends items based on people's similar preferences. For example, if two consumers rank similar things, they may if most people have similar preferences for certain products, an unknown person is likely to have similar tastes as well.

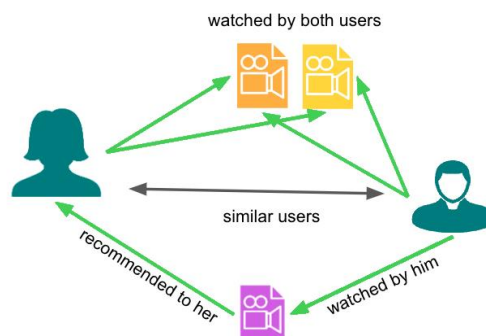


Fig 1: Collaborative Filtering.

Collaborative filtering algorithms typically employ the nearest-neighbour strategy, which involves calculating user similarity through computer methods [16]. Collaborative filtering techniques rely on similarity calculations between users or things to forecast ratings. The top N items are then displayed to users. The recommendation system analyzes user behaviour and preferences to discover comparable users. Recommendations based on similar user preferences [17]. The system's recommendations rely heavily on the user preferences it collects. To ensure a recommendation system's effectiveness, it's essential to choose and effectively preprocess crucial user preference information from a variety of sources.

B. Improved Collaborative Filtering Recommendation Algorithm

In a blended college teaching approach, collaborative filtering recommendation algorithms act as dynamic tools to personalize students' learning experiences. These algorithms examine user activities in the blended learning environment, such as resource utilization and engagement levels, to determine individual learning preferences [18].

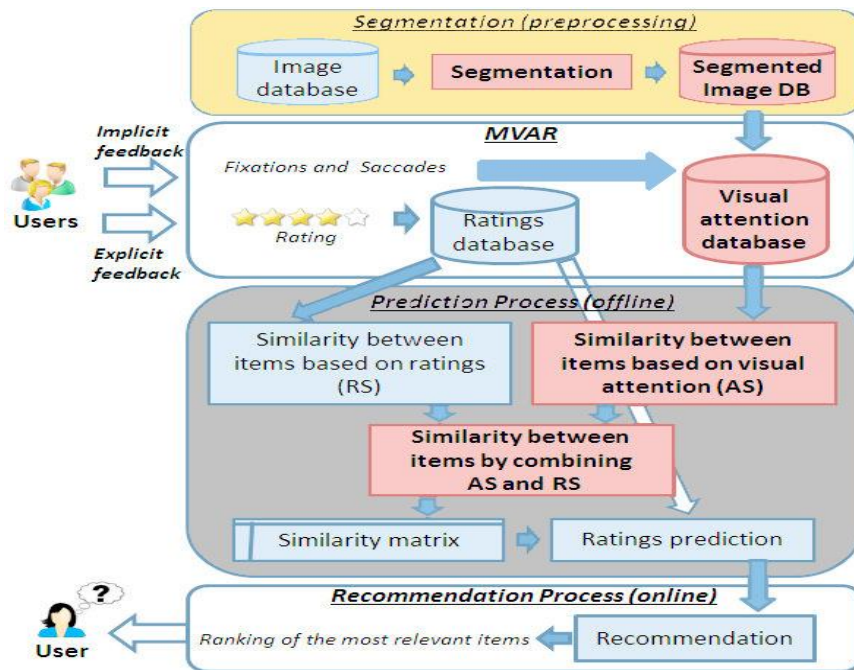


Fig 2: Collaborative Filtering Recommendation System.

Using this data, the algorithm creates personalized recommendations for learning resources, such as reading materials and multimedia content, based on each student's competence level, interests, and goals. These ideas, which are incorporated into the model, supplement traditional classroom instruction by expanding learning possibilities outside of the actual classroom.

Educators can use recommended resources to enhance class plans, debates, and activities, promoting seamless integration of online and offline learning. Furthermore, the algorithm's adaptive nature constantly fine-tunes recommendations depending on students' changing preferences and performance, offering individualized help and feedback. Finally, collaborative filtering algorithms in a blended teaching approach enable instructors to provide interesting and effective learning experiences that address the different needs of college students, hence improving language learning outcomes.

IV. RESULTS

Students' learning and practice processes primarily involve knowledge acquisition and consolidation. By analyzing students' learning records, they can create exclusive ability portraits and offer learning resources that align with their skills, leading to more efficient and targeted learning. The system accurately captures students' questions, including their steps, knowledge points, and time of completion. Analyzing learning logs helps students identify practice faults and master unskilled knowledge points. Using logs of student interactions with test questions to

measure their abilities based on knowledge points might assist students and teachers in better understanding their learning state and facilitate timely learning and consolidation. The recommended resources are evaluated to ensure they are within a suitable range of difficulty, avoiding very easy results as shown in Fig 3.

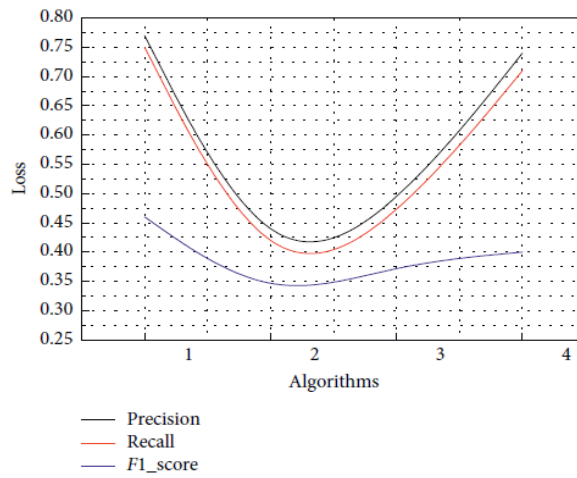


Fig 3: Performance evaluation chart.

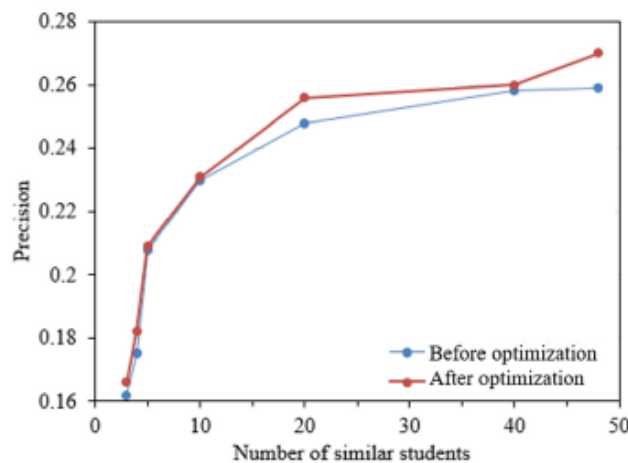


Fig 4: A comparison of the collaborative filtering recommendation algorithm's precision before and after optimization.

Figure 4 shows the precision of the collaborative filtering recommendation system before and after optimization for different numbers of similar students.

After refining the method for three comparable students, the precision rose from 0.162 to 0.166. Similar gains were observed when dealing with smaller numbers. For instance, with a count of 4, precision improved from 0.175 before optimization to 0.182 post-optimization. This trend continued as the count gradually increased (to 5, 10, 20, 40, 48), consistently enhancing precision across all scenarios. While the increments were modest, even the slightest improvement holds significance in the realm of recommendation systems. The refined collaborative filtering recommendation algorithm consistently outperformed its pre-optimized counterpart across all levels of similarity, indicating more effective utilization of analogous student data for precise recommendations.

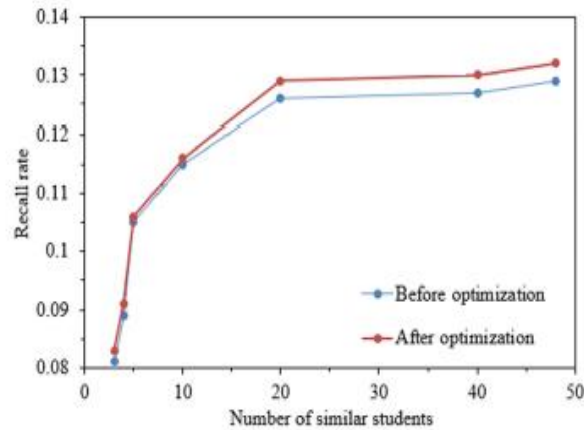


Fig 5: Evaluation of the recall rate of the collaborative filtering recommendation system before and after optimization.

Figure 5 presents the recall rates of the collaborative filtering recommendation system before and after fine-tuning across different group sizes of similar students. When analyzing three similar students, the recall rate was 0.081 prior to optimization, increasing marginally to 0.083 post-tuning. This implies that the refined algorithm may uncover more valuable items, particularly with a smaller cohort. At four similar students, the recall rate improved from 0.089 pre-optimization to 0.091 post-optimization, indicating a modest enhancement in algorithm performance. As the number of similar students increased (to 5, 10, 20, 40, 48), the optimized algorithm consistently exhibited a slightly higher recall rate across all scenarios, underscoring its efficacy in identifying valuable items for users.

The figure shows that the enhanced collaborative filtering recommendation system had a slightly greater recall rate than the pre-optimized method, even at similar student numbers. The updated system might provide more valuable recommendations to consumers, despite not being immediately noticeable improvements. Increasing recall rates in recommendation systems improves user experience and satisfaction by covering more relevant things. The modified algorithm demonstrated improvements and practical utility. The proposed approach performed averagely, but had a comparatively high value. Implementing a blended teaching paradigm based on collaborative filtering suggestion algorithms is anticipated to yield a variety of benefits, including improved student engagement, learning outcomes, and satisfaction. However, empirical research and assessment are required to assess the success of the model and address any issues that occur.

V. DISCUSSION

The use of collaborative filtering recommendation algorithms in a blended teaching strategy for college English offers a viable way to improve language learning outcomes. Using these algorithms, instructors can provide personalized learning experiences based on individual student requirements and preferences. This tailored approach increases student engagement, motivation, and autonomy by allowing learners to explore content that is relevant to their interests and competence levels. Furthermore, collaborative filtering algorithms help educators optimize resource allocation, find effective educational tactics, and provide adaptive feedback and support. However, data privacy concerns, algorithm bias, overreliance on technology, and user acceptance must all be addressed before collaborative filtering can be successfully implemented in the classroom. Despite these obstacles, the potential benefits of collaborative filtering suggestion algorithms in a blended teaching approach are significant, providing educators with unique tools to construct dynamic and successful language learning environments that meet the different needs of college students.

VI. CONCLUSION

The implementation of a blended teaching strategy for college English based on collaborative filtering recommendation algorithms marks a significant step forward in language education. Throughout this work, they looked at the theoretical foundations, practical ramifications, and pedagogical issues of adding collaborative

filtering algorithms into college English instruction. Using collaborative filtering algorithms, educators can personalize the learning experience for students, responding to their specific needs, interests, and levels of proficiency. The algorithm's capacity to assess user behaviours and preferences enables it to generate personalized recommendations for learning resources, hence increasing student engagement, motivation, and autonomy. However, implementing this paradigm is not without difficulties. Concerns like data privacy, algorithmic biases, and user approval must be addressed to ensure that collaborative filtering algorithms are used ethically and effectively in the classroom. Educators and legislators must collaborate to create strong policies and processes for protecting student data and encouraging appropriate technology integration. Despite these obstacles, the potential advantages of a mixed education model based on collaborative filtering recommendation algorithms are significant. Educators may empower children to achieve academic success and improve lifetime language skills by adopting innovative pedagogical techniques and harnessing technology. Looking ahead, ongoing research and innovation in this subject will provide exciting prospects to improve language learning results in college English courses.

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