Literature Review for Game Recommendation System

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Introduction

Recommendation systems have become an essential aspect of user experience in various industries, providing valuable suggestions to users and enabling them to discover products or services tailored to their preferences. Among the types of recommendation systems, personalized systems have gained prominence due to their ability to cater to individual user preferences, leading to increased user engagement and satisfaction. This literature review focuses on personalized recommendation systems in the gaming industry, particularly content-based filtering and collaborative filtering techniques. Additionally, the application of natural language processing (NLP) and other machine learning methods in these recommendation systems will be explored, highlighting their potential to enhance the overall performance and user experience.

Recommendation System Types

There are two types of recommendation systems: personalized and non-personalized. While non-personalized recommender systems offer the same suggestions to all users regardless of their individual interests, personalized recommendation systems offer different suggestions tailored to each user's preferences (Shah et al). Non-personalized recommendation systems operate autonomously, as their recommendations are not tailored to individual users. Consequently, these systems do not recognize users across different sessions and necessitate physical storage for their operation (Gupta). We will focus on and review papers in the field of the personalized recommendation game system because it could benefit users by providing users with increased engagement, tailored recommendations, and enhanced user satisfaction.

Content-Based Filtering

As one of the techniques of building a personalized recommendation system, Content-based filtering uses the characteristics of features of items to provide personalized suggestions to users. In the game scenario, the system would recommend games that are similar to games the user has previously liked or played based on the similarity of their features and attributes. A study incorporated Natural Language Processing techniques in the content-based filtering method to deliver customized game suggestions depending on the user's first game selections. By creating a data backend and extracting essential game attributes, the system compares genre, story, and gameplay similarities to produce suggestions. Users are given the chance to choose their chosen games from the offered possibilities in the final interactive web application. Finally, the author used Normalized Mutual Information (NMI) score to evaluate the application's performance and had a satisfactory score. This research shows how content-based filtering and NLP approaches may be used to create personalized game recommendation systems (Chythanya).

Digging into the NLP technique for content-based recommendation systems, the research evaluated the performance of using NLP techniques in the contend-based filtering system. Researchers used a dataset with almost 6 million ratings and employed a TensorFlow-based library to design a content-based filtering system. The author (Berbatova) suggested some improvements to better utilize NLP. These include better utilization of user tags information through a bag-of-words model, applying unsupervised dimensionality reduction algorithms, and using pre-trained word embeddings. Data could be enriched by scraping descriptions through websites to extract features and utilize TF-IDF vectors to represent features. For example, in the book recommendation, people could scrape book descriptions from Amazon or GoodReads to

extract useful features. Lastly, the author proposed that the recommendation task can be handled as a classification problem using deep learning methods like RNNs and LSTMs as well as algorithms like SVM and Naive Bayes. These improvements significantly enhanced the book recommendation system performance in their study (Berbatova).

Collaborative Based Filtering

Collaborative filtering is a technique used in recommendation systems to predict a user's preferences for products or services based on the preferences of other users with similar tastes. The basic idea is to analyze the patterns of behavior and preferences of a group of users and use that information to recommend items that are likely to appeal to new users with similar tastes. There is a game recommender system that utilizes collaborative filtering to filter and evaluate games based on the opinions of similar gamers. The system uses the individual ratings given by community members, along with the ratings of games that a particular player likes, to predict and recommend new games that match the player's preferences. To validate the accuracy of the recommendations, the system is tested on a standard dataset. The web-based system generates high-quality recommendations, providing potential benefits to the growing video game industry by introducing the right games that satisfy gamers' preferences (Anwar et al).

Deep learning is a helpful technique to build collaborative filtering via implicit feedback. Researchers employed matrix factorization and inner product for modeling user-item interactions and proposed NCF (Neural network-based Collaborative Filtering), a general framework that replaces the inner product with a neural architecture to find the arbitrary function from those data. The framework is a guideline to improve the deep learning methods on recommendation

and complements the mainstream shallow models for collaborative filtering, revealing a new angle of research potential. The authors created recommender systems for multimedia products, modeled supplementary information by expanding NCF, and create models for user groups. They also wish to investigate the use of recurrent neural networks and hashing methods in offering effective online suggestions (He et al).

Another study utilized data from the Steam platform to examine collaborative filtering methods for a video game-focused recommendation system. They utilized different metrics to assess the algorithms such as RSME, MAE, Precision@k, Recall@k, and F1@k. The study comes to the conclusion that techniques with low computational demands can nonetheless produce acceptable outcomes. They compared algorithms including K-Nearest Neighbors (KNN), Singular Value Decomposition (SVD), SVD++, Non-Negative Matrix Factorization (NMF), Slope One (a simple item-based algorithm that predicts ratings based on the difference between the average rating of two items) and Co-clustering. They finally used RMSE and MAE to evaluate the performance of all the collaborative filtering algorithms, using k-fold cross-validation. They found that SlopeOne and SVD++ were the best-performing recommendation algorithms although the results show that for the used dataset there is not a significant difference between the explored algorithms (Meteren and Someren).

User Experience

Understanding user experience in the context of recommendation systems is crucial for achieving a higher level of satisfaction and trust among users. Giving a reason to the user is essential for a recommendation system because it gives openness and accountability, which may boost user

happiness and confidence. It is easier for people to comprehend why a recommendation system is producing a certain suggestion and what criteria were taken into account when the system gives reasons. A paper conducted a survey for college-age student online shoppers to identify their preferences and essential elements for recommender systems in retail e-commerce. The results revealed that shoppers prefer short and relevant recommendations, with a maximum of three recommendations on one page. Moreover, they love to be provided with recommendation reasons Essential information for recommendations include the price, image, and name of products, while promotions, customer ratings, and feedback were identified as secondary types of information. The success of the recommenders was found to be greatly influenced by the content transparency of the recommender system interface (Ozok et al).

Conclusion

This literature review explored different techniques to build personalized recommendation systems in the gaming industry, with a focus on content-based filtering, collaborative filtering techniques, and the application of natural language processing and machine learning methods. Moreover, the review emphasizes the value of providing reasons for recommendations, as it fosters transparency, trust, and user satisfaction. In summary, the development and implementation of effective personalized recommendation systems, utilizing advanced techniques and ensuring transparency, can greatly contribute to enhancing user experiences within the gaming industry and beyond.

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