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# A Group-based Approach to Enhance Diversity and User Engagement in Movie Recommender Systems

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**Abstract**—Current movie recommender systems often prioritize accuracy, overlooking the diversity of recommendations and user interaction experience. Addressing these gaps, we introduce a system featuring rating lists from user groups alongside user-controllable options. Besides preference-based movie recommendations, our system aggregates rating lists from user groups that share common characteristics with the user. Recognizing that users have varied tastes, including low-rated movies in the rating list and exposing rating lists given by user groups can offer valuable and diverse reference than the user preference-based approach. Additionally, our system incorporates control options, aiming to improve the interaction experience by allowing users to participate more actively in the recommendation process.

## I. INTRODUCTION

In the information explosion era, the amount of content available for users to consume on the internet is growing significantly. To provide users the suitable contents they may like, recommender systems are widely adopted by internet services. In recent years, researchers developed recommender system algorithms extensively, significantly improving the accuracy of recommender systems.

In addition to the improvement of accuracy, recent research also focuses on the diversity of recommendations [1] [2]. Typical recommender systems use users' past interaction data to recommend items that best fit their preferences. While these systems can achieve high accuracy, they may reduce recommendation diversity and create a potential "echo chamber" effect by focusing solely on historical preferences. We believe that ensuring relevance while increasing the diversity of recommendations can help users discover more diverse and valuable contents.

The user experience of interacting with recommender systems is also crucial. Enhancing the interactive experience can increase users' trust in recommender systems, thereby improving user engagement and acceptance towards recommendations. Many studies have proposed various methods to improve the interactive experience, such as providing explanations for recommendations [3] [4] and adding control options [5], allowing users to gain a more intuitive and in-depth understanding of the recommendation process.

In this paper, we introduce a movie recommender system, FilmFlock, aimed at increasing the diversity of movie recommendations and enhancing user engagement with the system. In our system, we use two methods to recommend new movies

to users: one is based on user preferences, and the other displays historical movie ratings from user groups which share common preferences with the participant. Additionally, we added some control options to our system, allowing users to adjust the final recommendation results based on their needs.

## II. SYSTEM DESIGN

In this section, we provide a detailed introduction to FilmFlock, our movie recommender system. We use data from MovieLens [6] and IMDB dataset. The MovieLens data primarily includes a large number of real user ratings for movies. The MovieLens 25M database we use includes analytical data on movies, and the tag genome [7]. Detailed information about the MovieLens database can be found in Table 1. Additionally, we use the IMDB database to complement movie information, such as directors, actors, and overview of the movies.

After participants log into our system, it presents them with a list of movies which is sorted based on the popularity from IMDB. Participants are asked to rate at least twenty movies they have seen before. After participants complete this phase of movie rating, the system calculates their preferences based on their movie ratings to perform two types of movie recommendations.

TABLE I  
NUMBER OF ITEMS IN MOVIELENS DATASET

Dataset	Users	Movies	Ratings	Tags
MovieLens 25M	162,541	12,559	25,000,096	1,128

### A. Preference-based movie recommendations

User preference-based movie recommendations calculate participants' preferences based on three aspects: tags, directors, and actors. The system extracts preference scores for different tags/directors/actors based on participants' ratings for different movies, then generates movie recommendations from these three aspects, and ultimately merges them into one movie recommendation list. The default weights of the three aspects are equal, and the interface includes control options for users to adjust the weights of these three aspects according to their preferences. Additionally, in the recommendation list, there are colored dots next to the movie title indicating which aspect the recommendation comes from.

## B. Group-based Rating Lists

In addition to the traditional movie recommendation method based on user preferences, our system also introduces a movie rating list based on user groups. This feature aims to increase diversity to enhance traditional methods. We calculate the participants' relevance scores for each tag based on the movies they have rated and select the tags with the highest scores. For each tag, we select user groups from the MovieLens database, comprising users who also show a clear preference for these tags but are overall not similar to the participant. For each user group, we present a list of movies to the participant based on the most recent movie rating history of users in the group. Users can browse the rating lists of any user group for reference and can also choose any number of user groups to combine them, browsing the combined recent rating list.

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### Algorithm 1 Group-based Rating Lists Algorithm

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1: Input: Participant's movie rating data
2: Output: Group Movie Rating Lists
3: Calculate participant's relevance scores for each movie tag
4: Select top tags based on highest relevance scores
5: for each top tag do
6:   Identify top users for this tag
7:   Calculate similarity with these users
8:   Group least similar users together
9: end for
10: for each user group do
11:   Collect recent movie ratings of the group's users
12:   Combine movie lists from the group
13:   Sort combined list by latest timestamp and average
       rating
14: end for
15: return List of movies for the participant

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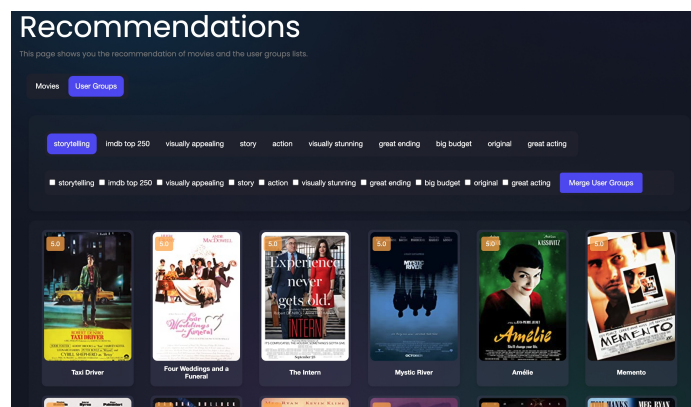


Fig. 1. Group-based rating lists page.

As shown in Fig.1, users can switch the recommendations by clicking on "Movies" and "User Groups" buttons. They can then select the group by clicking on buttons with group names. They can also obtain multi-group list by merging groups. The movie thumbnail below show the movie's title and poster, ordered according to average rating in the group. Users can hover on the poster to get more detailed information like directors, actors and overview.

## III. DISCUSSION AND FUTURE WORK

The two different movie recommendation methods bring distinctly different recommendations to users. The user preference-based movie recommendation method is similar to the systems widely used in streaming services, but we have added user control options and some explanation for the recommendation, allowing participants to better understand and adjust the recommendations. The group-based movie rating list method can greatly expand the diversity of recommendation results. While still maintaining relevance, we provide users with rich and diverse choices. Because that we select the most recent rating history records in the user group, this list can capture the latest interest changes of users in the group and does not always include only highly rated movies. Compared to simply recommending movies that participants might like, this method can expose participants to a large number of movies that would not have otherwise been displayed to them. In conclusion, we presented a group-based approach to enhance diversity and user engagement and proposed the FilmFlock system. We believe this method can expand the range of movies that participants choose to watch next and help them discover and understand the interests and preference change of other users, mitigating the impact of the echo chamber.

In the future, we plan to conduct experiments to validate whether the introduction of movie rating lists based on user groups and the interactive recommendation mechanism can bring a more diversified range of movie choices and references to participants, as well as overall enhance amount of user engagement with the recommender system.

### ACKNOWLEDGMENT

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