

# Generate Meaningful Group Recommendations by Neutralizing Individual User Satisfaction

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**Abstract:** This proposed research considers- the problem of delivering meaningful recommendations to groups so that each group member has a similar degree of satisfaction. Useful recommendations can only be generated if recommender system understands the user preferences well. Generating fair recommendations to group is difficult because group members have individual preferences which may not compulsorily match with other members of a group. Focus of the proposal is on understanding individual preferences of members and to generate an ordered list of items or events by neutralizing user's satisfaction. In this proposal, two different strategies are introduced to improve the group satisfaction rather than simply averaging the preferences of group members so that each member feels satisfied.

**Index Terms**—Group recommendation, individual user satisfaction, neutralizing user satisfaction, recommending a list of items, ordering sequence of recommendations, preference aggregation.

## I. INTRODUCTION

### A. Introduction to Recommender System

Recommender System is a system which generates meaningful recommendations to a collection of users for items or products that might interest them. The concept of recommender system generally grows out of idea of information reuse. It is a system where one would know something by following the footsteps of others, also known as social navigation. Suppose you are in a stadium to watch an event. As the event ends, you look for the near exit. If you don't know the way, you just follow the crowd because almost everybody is going towards exit. If you follow an individual you might end up at cafeteria or some other place but if you follow the crowd you will always find the exit.

Recommender system is based on the concepts of Machine Learning and Information Filtering. It enhances user's experience by assisting in finding information and reducing search and navigation time. It performs better if system has good knowledge of user's preferences. It is also called filtering system because it actually discards or filters out irrelevant items. For example, if a customer has shown interest in a product by viewing or placing it in shopping cart, he is likely to receive recommendations for some additional products. These recommendations can be generated by using multiple strategies. Some of them could be:

- Recommend products having similar or complimentary attributes
- Recommend products based on past purchasing behavior
- Recommend products chosen by similar customer Or a combination of above.
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- Suggestions of friends on Face book, videos on YouTube, books on Amazon, or jobs on LinkedIn are some applications of recommender systems.

### B. Application of Data Mining in Recommender Systems

Data Mining is an analytic process designed to explore data in search of consistent patterns and systematic relationships between variables, and applying the detected patterns to new set of data. In Recommender system's context, Data Mining is used to describe techniques to infer recommendation rules or build recommendation models from dataset. Recommender systems make recommendations based on information derived from actions or attributes of user. Some of the key data mining techniques applied in recommender systems are Clustering, Association, Graph mining, etc. Clustering techniques can be used to develop clusters and groups of users with similar interests. To generate recommendation for a group or cluster, recommender system considers preferences of group members. Clustering technique can also be applied in computing distributed neighbor as part of several recommender systems.

Association techniques can be applied in computing item-to-item correlation which means to find out items associated with the selected item. Graph mining techniques such as horting are applied in recommender systems to recommend items by combining nearby user's opinions attached with an edge. Edges between users indicate the degree of similarity between users.

## II. PROBLEM STATEMENT

Objective of group recommender system is to suggest meaningful items to a group of users by understanding their individual preferences. Members of a

group can have diverse taste and preferences. It is difficult to satisfy each member with one single recommendation. To achieve this goal, recommender system should deliver a list of recommendations that not only satisfies the whole group but also matches the individual preferences at same time. So a list or a subset of items in a recommendation list could be ordered in such a manner that keeps the individual and group satisfaction score high at all times. Example-In the field of music it is difficult to satisfy each member of a group with same song. So a list of songs arranged in an order should be generated so that at every song, group members as well as the whole group feel satisfied.

### III. OBJECTIVES OF THE STUDY

- (i) How to improve the quality of group recommender system?
- (ii) How to recommend a list of items in group with heterogeneous preferences?
- (iii) What are possible ways for satisfying group individuals other than average aggregation?
- (iv) How to order the list of recommendations such that at every node group members and the whole group feel satisfied?
- (v) What strategies can be applied to overcome these challenges?

### IV. LITERATURE REVIEW

Many studies have been conducted globally to improve the quality of group recommendation system. Judith Mastoff observed in his research that people normally use group aggregation strategies like average, average without misery, average with least misery while making recommendations in group. He mainly stressed on preventing misery and starvation. Lara Quijano-Sanchez, Juan A. Recio-Garcia, Belen Diaz-Agudo, and Guillermo Jimenez-Diaz introduce a Facebook Application: Happy Movie- for movie recommendations to group. And the recommendation made to group is based on three features: personality, social trust and memory of past experience. They named this approach of making recommendations as **GRUPITO** (Group Recommendations Using Personality, Interests and Trust Organizations). Baccigalupo presented a web radio that plays a list of songs according to preferences of listeners and fulfills four properties: variety, smoothness, customization and fairness. It uses a three phase process of building the iterative list Retrieve, Reuse and Revise. In Retrieve phase, a candidate list of songs was retrieved by removing the tracks of recently played songs and artists from entire list to ensure variety of songs. The candidate list is then arranged according to smoothness of transition. In Reuse phase, individual song ratings of each listener were combined into group rating to achieve fairness. In Revise

phase, listeners can customize or adjust rank of the songs produced in reuse process by expressing their preferences in form of feedback.

### V. RESEARCH METHOD(S)

The approach of proposed research to generate an ordered list of items as recommendation in a group is an iterated process that adds in new item to the list based on neutralizing the user's satisfaction. Firstly, preferences of each group member can be fetched or obtained from past behavior like songs and artists most played and rated by them. Then sort the items based on the average aggregation of preferences and retrieve top-N items from the sorted list. The candidate list retrieved in phase 2 can be ranked iteratively by using any of the following strategies:

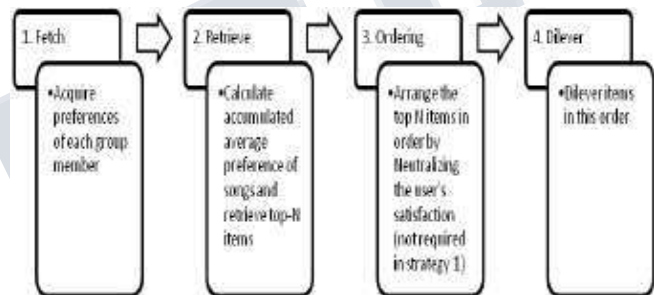
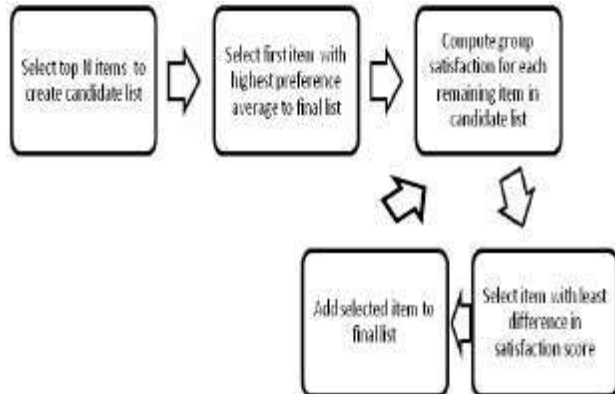


Fig 1: Proposed approach to generate ordered list of items

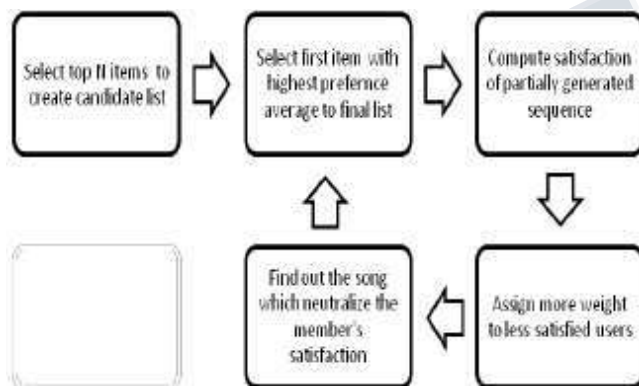
**Strategy 1:** The simplest strategy is to display the items in the same order in which they were retrieved.

**Strategy 2:** Sequence of items can be generated by predicting satisfaction of each user by assuming that satisfaction will be equally influenced as previous items in the ordered list. To add a new item to the final list to be delivered, compute accumulated satisfaction of group for each item remaining in candidate list. And after comparing accumulated satisfaction and their differences, the song with least difference in accumulated satisfaction can be added in final list.



**Fig 2: Proposed approach to generate ordered list of items using Strategy 2**

**Strategy 3:** To generate sequence of items to be delivered in group, satisfaction-weighted aggregation method can be applied and members who are less satisfied with partial sequence can be given more weight to neutralize their satisfaction with the next item.



**Fig 3: Proposed approach to generate ordered list of items using Strategy 3**

## VI. EXPECTED RESULTS AND OUTPUT OF THE STUDY

This proposal will adopt a focused research on delivering the ordered items to a group that is liked by each group member while preserving and neutralizing member's satisfaction. The technique can be used to deliver an ordered list of songs as recommendation to group, and may also be applied to other contexts.

## REFERENCES

[1] Prem Melville and Vikas Sindhvani. Recommender Systems. 2009.  
 [2] J. Ben Schafer. The Application of Data Mining to Recommender Systems. In DM, 2004.

[3] SihemAmer-Yahia and et. al. Group Recommendations-Semantics & Efficiency. In VLDB, 2009.

[4] Judith Masthoff. Group modeling: Selecting a sequence of television items to suit a group of viewers. In UMUAL, 2004.

[5] Lara Quijano-Sanchez, Juan A. Recio-Garcia, Belen Diaz-Agudo. Personality and Social Trust in Group Recommendations. In 22nd International Conference on Tools with Artificial Intelligence, 2010.

[6] Lara Quijano-Sanchez and et. al. Happy Movie: A Group Recommender Application in Facebook. In the Proceedings of the 24th International Florida Artificial Intelligence Research Society Conference, 2011.

[7] Claudio Baccigalupo. Poolcasting: an intelligent technique to customise music programmes for their audience. PhD thesis, UAB, 2009.