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A Survey on Recommender system using collaborative filtering Techniques

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Abstract:

An important response to the information overload problem is provided by the recommender system, as it presents users more personalized and practical information services. In the recommender systems field Collaborative Filtering (CF) is the most successful technique. For users based on their neighbor's preferences Collaborative filtering creates suggestions. The main objective of this paper is to show various challenges regarding to the techniques that are being used for generating recommendations. But current CF suffers from poor accuracy, scalability data sparsity and big-error prediction.

As the number of customers and products in recent years are growing rapidly poses some key challenges for recommender systems. In which more recommendations per second for millions of customers and products need to be performed and high quality recommendations are required. Thus, it becomes progressively more important and difficult to enhance the scalability and efficiency of collaborative filtering. By giving the overview of these problems we can improve the quality of recommendations by inventing new approaches and methods.

Keywords:

Collaborative Filtering, Recommendation System, Object Typicality.

Introduction:

Recommendation systems found their application in the field of e-commerce and internet where items suggest to a group of user on the basis of their requirement based on their interest.

A recommendation system is a type of information filtering system that built a model from the characteristic of an item according to the rating or prediction, given by a user to an item. Collaborative filtering (CF) is an important and popular technology for recommender systems.

There has been a lot of work done both in industry and academic level. These methods are classified into user-based CF and item-based CF. The basic idea of user-based CF approach is to find out a set of users who have similar favor patterns to a given user. But these collaborative filtering methods have facing some problems like-

- Data Sparsity.
- Recommendation accuracy

A distinct feature of the typicality-based CF recommendation is that it selects the "neighbors" of users by measuring users' similarity based on user typicality degrees in user groups, which differentiates it from previous methods. To the best of our knowledge, there has been no prior work on using typicality with CF recommendation. TyCo provides a new perspective to investigate CF recommendations.Typicality-based CF method has the advantages:

- It works well even with data sets,
- It can reduce the number of big-error predictions.
- It improves the accuracy of predictions.

Related work:

1.Object Typicality-
According to the study of cognitive psychology, object typicality is different from object membership.

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The former is a measure of the goodness degrees of objects as exemplars in a concept [7], and the later is a measure of degrees of objects belonging to a concept. Psychologists find that people generally are more interesting in typical objects than atypical ones in concepts [17].

2.Recommendation System:

There has been many works on recommendation systems and most of these works focus on developing new methods of recommending items to users, e.g., works in [13] [24]. Currently, recommendation methods are mainly classified .

1. Content-based Recommendation Systems:

The inspiration of these kind recommendation methodscomes from the fact that people had their subjective evaluations on some items in the past and will have the similar evaluations on other similar items in the future. These kind recommendation methods predict the preferences of active users on items based on the preferences of other similar users or items.

2.Collaborative Filtering Recommendation Systems:

These kind recommendation methods predict the preferences of active users on items based on the preferences of other similar users or items. For the reason that collaborative filtering methods do not require well-structured item descriptions, they are more often implemented than content-based methods [1] and many collaborative systems are developed in academia and industry.

3. Hybrid Recommendation Systems:

Several recommendation systems use a hybrid approach by combining collaborative and content-based methods, which helps to avoid some limitations of content-based and collaborative systems. A naive hybrid approach is to implement collaborative and content based methods separately, and then combine their predictions by a combining function, such as a linear combination of ratings or a voting scheme or other metrics.

Proposed work:

In this paper, we borrow the idea of object typicality from cognitive psychology and propose a typicality-based CF recommendation approach named TyCo.The mechanism of typicality-based CF recommendation is as follows: First, we cluster all items into several item groups. Second, we form a user group corresponding to each item group (i.e., a set of users who like items of a particular item group), with all users having different typicality degrees in each of the user groups.

Third, we build a user-typicality matrix and measure users' similarities based on users' typicality degrees in all user groups so as to select a set of "neighbours" of each user. Then, we predict the unknown rating of a user on an item based on the ratings of the "neighbours" of at user on the item.

We propose an error-correction technique to suggest similar terms for the query keywords and return answers of the similar terms. To help users formulate high-quality queries, as user's type in keywords, we suggest keywords that are topically relevant to the query keywords and we propose a query expansion-based technique to recommend users relevant keywords.

Advantages of Proposed System:

1. It improves the accuracy of predictions when compared with previous recommendation methods.

2. It can reduce the number of big-error predictions.

3. It works well even with sparse training data sets.

4. Users find relevant patents more easily and improve user search experience.

5. Users can interactively issue queries and modify their keywords.

6. Provide users with gratifications.

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Algorithm Used:

No	Algorithm Name	Advantage over Existing Algorithm
1	Cluster Model Algorithm	1. Cluster models divide the customer base into many segments and treat the task as a classification problem. 2. The algorithm's goal is to assign the user to the segment containing the most similar customers. 3. It then uses the purchases and ratings of the customers in the segment to generate recommendations. 4. Using a similarity metric, a clustering algorithm groups the most similar customers together to form clusters or segments.
2.	K-means clustering algorithm	1. Fast, robust and easier to understand. 2. Gives best result when data set are distinct or well separated from each other.

Architecture:

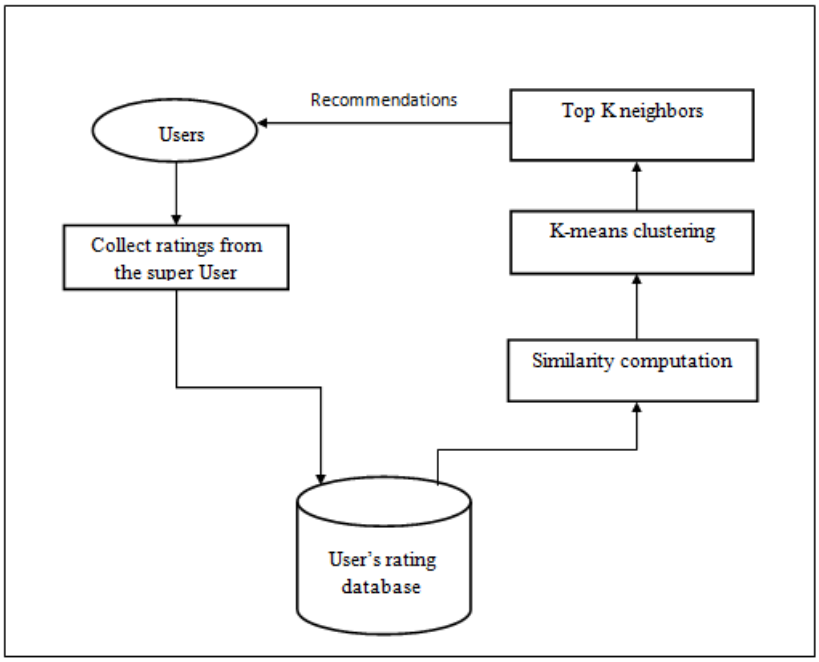

Fig. Proposed architecture for recommendation system using collaborative filtering

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Explanation:

The ratings are collected from the super user. The ratings are collected and are represented in the form of user-item matrix .The ratings of the super user are compared with other users in the rating database and their similarity are computed using Pearson's correlation coefficient. Using the similarity values we cluster the users based on K-means clustering approach and find the top k neighbors for producing recommendations. The recommendations from the top k neighbors are the products that the super user has not accessed yet that are given high ratings by their top neighbors.

Conclusion:

In this paper, we investigate the recommendation system from a new perspective and present a novel recommendation method based on object typicality. A distinct feature of the typicality-based recommendation method is that it predicts ratings based on user typicality and item typicality. The higher typicality degrees of users and items in the corresponding user and item groups, the higherrecommendation scores. To the best of our knowledge, it is the first work which applies typicality to handle recommendation problem. Evaluation shows that the typicality-based method outperforms previous recommendation methods on recommendation quality.

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