# Provision of Serendipitous Personalized Recommendation Engine using User Based Collaborative Approach

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**ABSTRACT**:The huge amount of online information as increased more and more. The process of searching has become a very complex.to reduce the process of searching on the related items/product Personalized recommendation is a desirable way to improve customer satisfaction and retention. But now a days the focus is on the veracity. This paper proposes a recommendation system that focuses not only on predictive accuracy but also serendipity. That which provide the increased efficiency and veracity to the users.

**KEYWORDS:** Recommender System; Serendipity; collaborative filtering; DE clustering.

## I. INTRODUCTION

In order to overcome information overload, recommender systems have become the key tool for the user's .And the actualized recommendations on the items such as movies, music's, books, news, cosmetic products and web pages. The Personalized recommendation is desirable way to increase customer satisfaction and retentionThe purpose of recommendation engine is to recommend the products that are applicable to customers who shop by online and reduces the time of searching. However, items that suit users' interest are not much useful when the users are already used with the items as soon as they viewed the product on the blog. This means that recommender systems are required to recommend items that not only suit the tastes of customers but also from comparing unknown to the users. Newly, serendipity is used in the recommender systems.to increase the efficiency and veracity. Recommendation system based on these traditional approaches focus on prognostic-analysis for providing veracity. Nonetheless, the improvement of recommender systems that consider factors other than veracity alone has been attempted in recent years. The current study proposes a system for serendipitous recommendation such that users arefavorably surprised by the recommendations. I use a hybrid approach that will implement a diversity algorithm on the base of existing collaborative algorithm to provide novelty.

## II. RELATED WORK

Researches to improve existing recommendation systems have been carried out. Hybrid approaches which combine content-based and collaborative filtering in different ways were pro-posed to alleviate the sparsely problem, where more information were mined than just in each of them. The categorized items into many categories using content information and chose recent categories to perform Item-Based Collaborative Filtering (IBCF). The group similarity byclustering and used it to modify original item-item similarity matrix. The principle of utilization of rating data in these algorithms is shown in some approaches emphasize utilization of time information to deal with the dynamic nature. Brought matrix factorization and Markov chainstogether to form a factorized personalizedMCmodel a dynamic IBCF with users' implicit feedback by using time decay functions in the calculation of the similarities.

Veracity is one of the most important concerns in recommender systems. However, the different recommendations is also of interest. Many showed that customers who were recommended books of different genres had higher satisfaction throughout their experiments. And also recorded that serendipity-oriented recommendation engine was able to recommend product that are attractive and unexpected by the users. In existing serendipity-oriented recommender engine systems, and product is modeled as a pair of attribute values. Here it adopts folksonomy in order to represent the characteristics of items. A fusion-based approach that can recommend serendipitous items by combining two favorite items.

### III. PROPOSED ALGORITHM

I propose a hybrid approach that will implement a diversity algorithm on the base of existing collaborative algorithm to provide the novelty

**User based collaborative filtering**

First I use user-based collaborative filtering. The idea of collaborative filtering is in finding users in a faction that share appreciations. If pair of customers have same or almost same rated items in common, then they have alike tastes. Such customers build a community or a so called neighborhood. A user gets recommendations to those items that customer hasn't rated before, but that were already positively rated by users in their neighborhood.
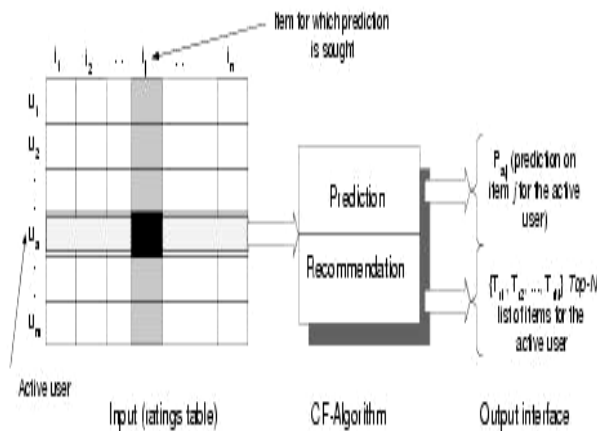


**Figure 1.User based collaborative filtering**

There are a many mathematical formulations that can be applicable to calculate the similarity between pair of users. As can be seen in the formulae below, each formula includes terms summed over the set of common item $U$.I use cosine based similarity algorithm to implement. And also called as **vector-based similarity**, this formulation views set of product and their ratings **as vectors**, and defines the similarity between them as the angle between these vectors:

$$sim(i,j) = \frac{\sum_{u \in U}(R_{u,i} - \bar{R}_u)(R_{u,j} - \bar{R}_u)}{\sqrt{\sum_{u \in U}(R_{u,i} - \bar{R}_u)^2}\sqrt{\sum_{u \in U}(R_{u,j} - \bar{R}_u)^2}}$$

The resulting similarity ranges from −1 meaning exactly opposite, to 1 meaning exactly the same, with 0 usually indicating independence, and in-between values indicating intermediate similarity or dissimilarity.

**Relation mining of rating data**

For the scarcity of recommendation data, the main difficulty of capturing users' dynamic preferences is the lack of useful information, which may come from three sources - user profiles, item profiles and historical rate.
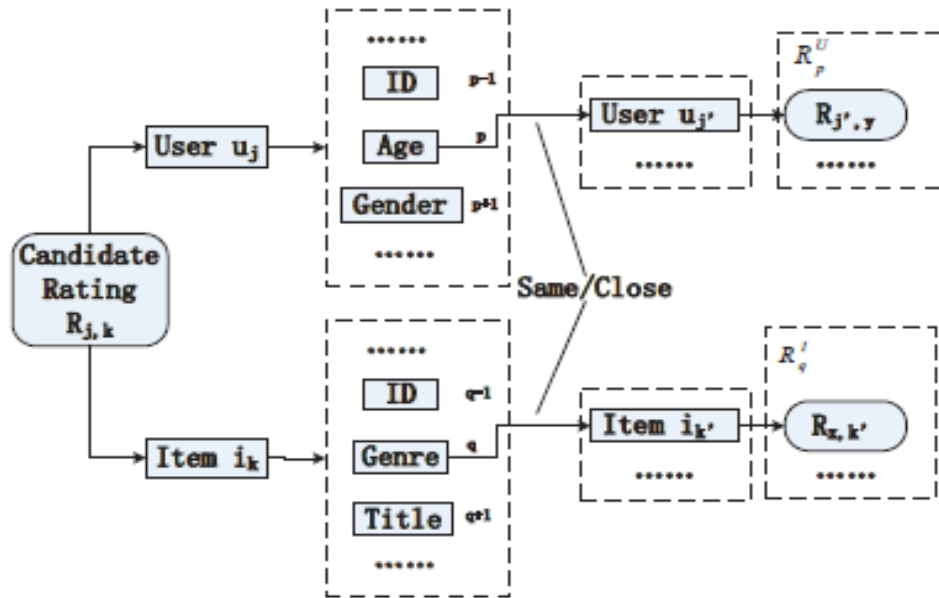
**Figure 2.Rating data**

Traditional Algorithms heavily rely on the co-rate relation (to the same item by different users or to different items by the same user), which is rare when the data is sparse. I introduce the *semi-co-rate* relation between ratings whose corresponding user profiles or item contents have similar or identical content in one or more attributes. Since *semi-co-rate* is much less constrained, I extend the co-rate relation to it using user profile and item content, and propose a new way of finding useful ratings for dynamic personalized recommendation.

### De-clustering

I introduce a graph-based algorithm termed De-clustering. De-clustering produces a ranked list of the least "clustered" or "boring" items for a user.

$$Bubble\ (u, i)=(1-\lambda)rank_{basic,u,i}+\lambda rank_{declustering,u,i}$$

The De-clustering algorithm attempts to identify nodes that lie on the edge of clusters in a user's graph, avoiding heavy concentrations of previous activity ("boring" recommendations) whilst still maintaining overall similarity. In this way I hope to help users expand their taste, literally pushing the boundaries of the region their behavior occupies in the feature-space. This recommendation strategy is motivated by concepts of social network theory such as clustering and brokerage.I introduced Novelty and Serendipity as indices of recommendation

### IV. CONCLUSION AND FUTURE WORK

By using the proposed system I can introduce serendipity into recommendation system without compromising accuracy. This way the user will be able to explore new items and thereby more interested and satisfied. And it comprises the result even when the large amount of data found.

### REFERENCES

[1] B. M. Sarwar, G. Karypis, J. A. Konstan, J. Riedl, Item-based collaborative filtering recommendation algorithms, in: WWW, pp. 285–295.
[2] K. Yu, A. Schwaighofer, V. Tresp, X. Xu, H. Kriegel, Probabilistic memory-based collaborative filtering, IEEE Transactions on Knowledge and Data Engineering 16 (1) 56–69.
[3] X. Tang , J. Zhou, Dynamic Personalized Recommenldation on Sparse Data, IEEE Transactions on knowledge and data engineering 25(12)(2013) 2895 – 2899

[4] Z. Quan, Collaborative filtering recommendation based on user personality Information Management, 6th International Conference on Innovation Management and Industrial Engineering (ICIII), 2013

[5]K. Yu, A. Schwaighofer, V. Tresp, X. Xu, H. Kriegel, Probabilistic memory-based collaborative filtering, IEEE Transactions on Knowledge and Data Engineering 16 (1) (2014) 56–69.

[6] J.k. Kim, Y. H. Cho , W. J. Kim , J.R. Kim , J.H.Suh, A personalized recommendation procedure for Internet shopping Support, Electronic Commerce Research and Applications 1 (2012),Elsevier 301–313

[7]W. Honga, L. Li, T. Li, Product recommendation with temporal dynamics, Expert Systems with Applications 39 (2012), ELsevier 12398–12406.

[8] R. Burke, Hybrid systems for personalized recommendations. Intelligent Techniques for Web Personalization(2013) 133–152

[9]Hisaaki Yamba,Michihito Tanoue,Kayoko Takatsuka,Naonobu Okazaki,Shigeyuki Tomita,On a serendipity-oriented recommender system based on folksonomy and its evaluation,17th International Conference inKnowledge Based and Intelligent Information and Engineering System-KES2013

[10]Yuan Cao Zhang, Diarmuid Ó Séaghdha, Daniele Quercia, Tamas Jambor, Auralist: Introducing Serendipity into Music Recommendation, Research Note RN/11/2.

[11] Jae Kyeong Kima ,*, Yoon Ho Chob, Woo Ju Kimc, Je Ran Kimc, Ji Hae SuhaA personalized recommendation procedure for Internet shopping, Electronic Commerce Research and Applications 1  301–313, Support, Electronic Commerce Research and Applications 1 (2002) 301–313

[12] Berlin, Germany, Algorithms and Methods in Recommender Systems, Daniar Asanov
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