Web Recommendation System for E-Commerce Applications

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***Abstract*:- The internet has become a significant source of information .it has provide platform for many e-commerce enterprises. These e-commerce sites have very broad variety of products and have loads of information about the product or services, so it is difficult for the customers to choose best product according to their needs. To overcome the problem of information overload, many Recommendation techniques have been proposed earlier. A personalized recommendation system can handle this issue. There are still challenges in Recommender system 1. The items and user profiles in e-commerce sites such as e-learning, e-business are so complex and vague so they can be described as complex tree structure. 2. Attributes of items and user behavior are subjective, vague and imprecise. These in turn induce uncertainty in representing and reasoning on items' features, users' behavior, and their relationships so fuzzy set theory is used to handle this uncertainty. An item tree and user request tree-based hybrid recommendation approach is then developed. To model user's fuzzy tree structured preferences, a fuzzy preference tree model is proposed. A fuzzy preference tree-based recommendation approach is then developed. Experimental results on an Australian business dataset and the Movie lens dataset show that the proposed recommendation approach have good performance and handled tree-structured data efficiently.**

Keywords: Fuzzy set, Recommendation System, Clustering, Tree similarity, Tree merging.

INTRODUCTION

E-commerce web-sites are providing new business portals and large amount of product information, so customers spend more and more time browsing the net in order to find the right information or product. One solution to overcome with this problem is to develop a personalized Recommendation system. This system retrieves the information desired by the customer and helps him in determining which product to buy. In CF systems user ratings are expressed as binary values. Rating greater than 3 considered as item liked by the user and less than 3 as item, disliked by the user. Same rating can have different meaning to different users so ratings depend on the particular human thinking process. Same rating say 3 on scale of 5 does not mean equal degree of interest in an item. This all contributes to Fuzziness. Item attributes and user behavior are subjective, not clear and inaccurate. These all contributes to uncertainty. How to represent uncertainty of item features and user behavior? To handle this uncertainty Fuzzy theory is used to represent item features and user behavior. Fuzzy theory represents item and user preferences as vector accordingly. Items or user profiles in a B2B environment have complicated structures, such as tree structures. So recommendation systems have hardly used in the B2B environment. For example, a business in a B2B application environment, there are many product categories, each of This may have many of subcategories, under which there may be multiple specific products, which together form a tree structure. In earlier approaches, an item is normally described as a single value or a vector. The fuzzy preference models cannot deal with tree-structured data in a Web-based B2B environment.

This study resolve challenges like, Tree structured data, tree structured user preferences, uncertainty in user preferences, and personalization problem in Recommendation system and propose a fuzzy tree structured user preference tree based recommendation system. Recommender systems are used by E-commerce sites. They help users to select right product in less time .E commerce sites have loads of information so recommender system works as information filtering technique. Recommender system recommend items to the user based on the past buying behaviors or items purchased by similar users like CF systems or based on preference given by the user. In CF systems user ratings are expressed as binary values. Rating greater than 3 are considered as item liked by the user and less than 3 as item disliked by the user same rating can have different meaning to different users so ratings depend on the particular human thinking process. This all contributes to Fuzziness. Item attributes and user behavior are subjective, not clear and inaccurate.

These all contributes to uncertainty. To handle this uncertainty Fuzzy theory is used to represent item features and user behavior. Items or user profiles in ae-commerce sites and in other B2B sites have complicated structures, such as tree structures. ; . In earlier approaches, an item is normally described as a single value or a vector. This study resolve challenges like, Tree structured data, tree structured user preferences, uncertainty in user preferences, personalization problem in Recommendation system and propose a fuzzy tree structured user preference tree based recommendation system.

RECOMMENDATION SYSTEM TECHNIQUES

Collaborative Filtering: A collaborative filtering recommendation system recommends items to the user based Upon the recommendation of similar user's.

Content based Recommender Systems: Content based recommendation system recommend items to the user based on the items purchased in the past history and profile of the user.

Knowledge base Recommendation system: There are many items which are not purchased frequently so very less ratings are available for these items. In this case knowledge based recommendation system is used. User gives his preferences for the items then items are recommended based on these preferences.

Demographic: This technique use information about the user like age, gender, location , occupation etc. similar users are find out based on this demographic information.

Hybrid Recommendation system: This technique combined any two approaches to remove issues in recommendation technique.

ISSUES IN RECOMMENDATION SYSTEM

Data Scarcity: When there is very less ratings about items then it is very difficult to recommend items to the user.CF systems suffer from this problem.

Cold Start: There are two kinds of cold start problem, new user and new item problem. There is no information about new user and new item so it is difficult to recommend items.

Scalability: It is the ability of recommendation system to handle growing amount of information. Information about the user and item grows rapidly on the internet. CF systems Becomes expensive to handle growing amount of information and gives inaccurate recommendations.

Over Specialization: Recommendation systems recommend items based on previous history.

The modern life style and economical change puts roots to the electronic business by means of using internet. This makes the interaction by selling and buying products by the consumers. To enable this process in a well defined manner an automatic system is required to handle the product or services for the customers. Today's trend has dealing with many e-business applications but those still with some basic drawback to be overcome. That to be developed in order to save the time as well as maintaining the accuracy of the business. In e-business application have a vast amount of data's which can be stored, and retrieving the accurate one is more complicated among the applications by means of an automatic system is too tedious. To support this process various methodology is arise with common factor known as user preference.

However by means of discussing with the user preference will not be a practical solution. This thought raises the evolution of tree structure. To be structure a fuzzy is implemented on the user preference tree structure strategy. In which web based environment is the technology based component that enables online discussion, data collection, resource sharing etc. By means of a customer details can be saves and new services can be predicted by the application. To do this various algorithms were discussed in the research in which fuzzy is the most popular among those. Generally fuzzy deals with approximate instead of fixed or exact reasoning. It mainly works with the principle of 0 and 1with range between completely true and completely false.

With the use of recommendation methods, recommender systems, which are web-based support systems, actively suggest a set of limited and ranked items from all available items without the direct input of users.

Fuzzy user preference and item representations focus on vector representations accordingly. The abundance of information created and delivered via the Web provides excellent opportunities for the development of business-to-business (B2B) e-services, such as finding a business partner online. Excessive amounts of information on the Web create a severe information overload problem. An effective solution for this problem is the development of personalized recommender systems; however, recommendation techniques have been rarely used in the B2B environment. The main reason is that items or user profiles in a B2B environment are so complex that they can only be presented as complicated structures, such as tree structures. For example, a business in a B2B application environment may supply several product categories, each of which may contain a number of subcategories, under which there may be multiple specific products, which together form a tree structure. Therefore, tree-structured data modeling and tree matching methods are needed.

LITERATURE SURVEY

Tag-Based Collaborative Filtering Recommendation in Personal Learning Environments

This paper proposes a Tag based collaborative filtering Recommendation approach for personal learning Environments (PLE), s. Here 16 different tags based collaborative Filtering recommendation algorithms are implemented and compared in terms of accuracy and user satisfaction. User generated tags are combined with traditional collaborative filtering ecommendation. <User-item> Relation converted into the <user,item,tag>relation.. The result of evaluation shows that there is no relation between quality of user experience and high recommendation accuracy measured by statistical measure.

Typicality-Based Collaborative Filtering Recommendation

This paper proposes a different approach of CF Recommendation system based on object typicality and clustering. Similarity of user's is find out by comparing typicality degree of user's instead of co-rated items. This approach solves the problem of Data scarcity and recommendation accuracy.

Toward a user-oriented system for real estate websites

This paper proposes a recommendation system for real estate websites that helps users in purchasing new properties or homes. Recommendation system is developed by combining case based reasoning (CBR) and Ontology. Earlier systems supports single attribute search systems but this system support multi valued search system. User search behavior is studied and a knowledge base is prepared. Then the semantic meaning of attributes and relationship between them is defined by ontology. Result

shows that this approach is efficient and affordable for housing search in real estate websites.

Personalized Recommendation Combining User Interest and Social Circle

This paper proposes a hybrid collaborative filtering recommendation approach based on user preferences and item features. Traditional collaborative filtering recommendation approach has challenges like Data scarcity, Scalability, Similarity. To solve these challenges a recommendation algorithm is proposed based on user preferences and item features. The proposed algorithm is more accurate than other traditional CF methods. It also removes the problem of data scarcity to some extent.

Transfer Learning for Content Based Recommender Systems Using Tree Matching

This paper proposes a new approach of content based Recommendation system that is based on Transfer learning. This approach solves the problem of data scarcity when there is lack of information in target domain but there is sufficient information in other domain. A behavior graph model is prepared From the user preferences. BGM method is compared with other cross domain methods like KNN cross domain method. The result shows that performance of BGM is better than KNN.

Effective Recommendation Framework for Personal Learning Environments Using a Learner Preference Tree

A hybrid recommendation approach for e-learning environment is proposed. Two types of attributes are considered for learning resources 1.Explicit attributes like subject and name of the publisher 2.Implicit attributes can be extracted from the historical ratings of learners. Explicit attribute based RS and implicit attribute based RS prepared and combined to give accurate recommendation, s for learners, rating prediction is done by NNCF. This recommendation approach resolve the problem of Data scarcity, cold start and provide more diverse recommendation list sentences.

ARCITECTURE

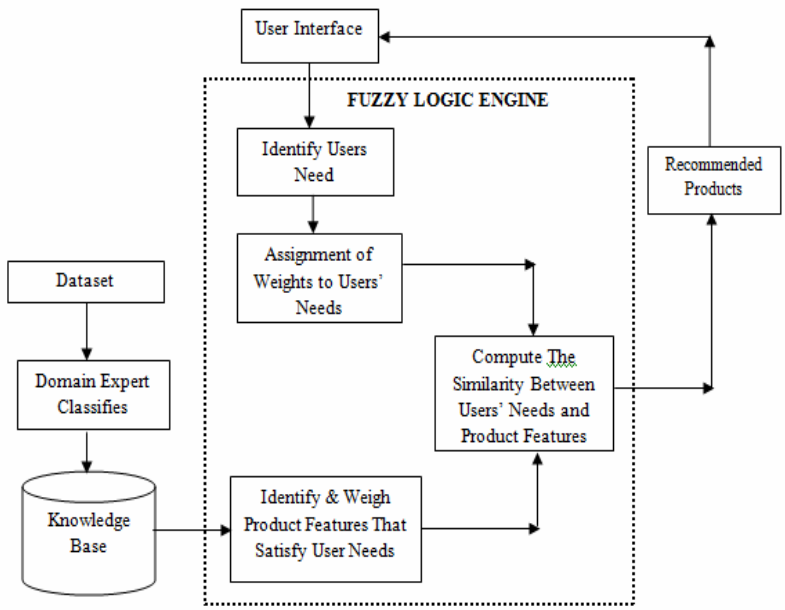


Fig: System Architecture

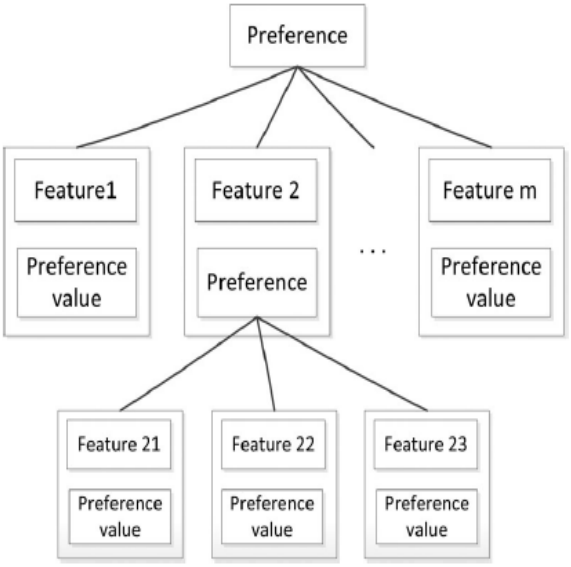
USER'S FUZZY PREFERENCES

To make a recommendation to a user, the information about the user's preferences must be known. The modeling method for user's preferences is presented in this section. Information about user preferences can essentially be obtained in two different ways: Extensionally and intentionally. The extensionally expressed preference information refers to information that is based on the actions or past experiences of the user with respect to specific items. The intentionally expressed preference information refers to specifications by the user of what they desire in the items under consideration. In this paper, the user preference model covers both kinds of information. In the practice of recommender systems, a business user's preferences are usually complex and vague. It might be difficult to require a business user to express a crisp preference for an item or a feature of an item, and it is therefore difficult to represent the user's preferences with crisp numbers. In this study, fuzzy set techniques are used to describe users' complex and vague preferences.

SIMILARITY COMPUTATION MODULE

Users' preferences or items' reputations are drifting, thus we have to deal with the dynamic nature of data to enhance the precision of recommendation algorithms, and recent ratings and remote ratings should have different

weights in the prediction. 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 rating records. 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. Useful ratings are discovered using the co-rate relation, which is simple, intuitional and physically significant when we go one or two steps along, but it strongly limits the amount of data used in each prediction.



FUZZY PREFERENCE RECOMMENDATION

More information can be used for recommender systems by investigating the similar relation among related user profile and item content. We proposed a novel dynamic personalized recommendation algorithm for sparse data, in which more rating data is utilized in one prediction by involving more neighboring ratings through each attribute in user and item profiles. A set of dynamic features are designed to describe the preference information based on fuzzy preference recommendation technique, and finally a recommendation is made by adaptively weighting the features using information in multiple phases of interest.

CONCLUSION

Here I Describes the Tree-Based Recommender System and identifies the problem in this system i.e. existing system needs to predict the preferences of each item in the database which results into high computation, memory and time requirement. To overcome this issue existing system is enhanced with clustering of items. So the recommendation approaches for e-business or e-commerce websites that have very complex product/services categories. User's fuzzy preference tree is compared with the target item tree and predicted rating of the item is calculated by this approach. This recommendation approach solves: A. Cold start issue more efficiently than other approaches because new user preferences are added with the previous preferences. B. Data sparsity issue because user-item matrix is not considered here for similarity. C. Scalability issue because user fuzzy preference tree updated efficiently.

FUTURE WORK

Considering the features and characteristics of groups of similar businesses and will develop methods for identifying business groups and make group recommendations.

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