

# Survey On Service Recommendations Techniques

Yamini Nikam<sup>1</sup>, M.B.Vaidya<sup>2</sup>

<sup>1</sup> Student, Computer Department, Amruthvahini College Of Engineering, Maharashtra, India.

<sup>2</sup> Assistance Professor, Computer Department, Amruthvahini College Of Engineering, Maharashtra, India.

## ABSTRACT

Service Recommender systems are nothing but the guide for a user or tools that provide appropriate recommendations to users in a personalized way. Now-a-days the amount of customers, services and online information is increasing rapidly causing a big data analysis problem for service recommender system. Also, the traditional recommender system has arise inefficiency and scalability problems while processing such large amount of data. The another issue with this systems are they do not consider different users choices and provide same ratings and recommendations to different users. So to overcome the all issues a new approach is used that uses keyword query to denote user interest and gives recommendations to users according to their interest. It uses user based collaborative filtering algorithm for that purpose.

**Keywords-** Recommender System, Big Data, Preferences, Keyword, Map-Reduce, Hadoop.

## 1.Introduction

Map-Reduce are a distributed parallel programming model introduced by Google to support massive data processing. First version of the Map Reduce library was written in February 2003. The programming model is inspired by the map and reduces primitives found in Lisp and other functional languages also it processes Very large data in a short amount of time as compare to relational database management system that is also known as RDBMS. Because of Big Data there are lot of challenges and opportunities occurs in industry as well as academia. Service recommender systems are greatly influences by big data tendency. Now –a –days the number of services are increasing rapidly and in that case effectively recommending the services to users is also become a important research issue. Service recommender systems provide appropriate guidance to users and also deal with overloaded services. There are various applications that use recommender systems such as CDs, web pages, books and also such other products. So, to develop new approaches for service recommender systems is the current research trend in industry and also in academia.

## 2 Literature Survey:

Here we reviews the main recommendation techniques, i.e. traditional methods such as collaborative filtering -based, content-based, knowledge-based, and hybrid methods, and recently developed advanced methods, such as fuzzy set-based, social network-based, trust-based, context awareness-based, and group recommendation approaches.

### 1. CONTENT-BASED RECOMMENDATION TECHNIQUES

Content-based (CB) recommendation techniques recommend articles based on previously preferred similar items by a specific user [2]. The CB recommender systems first analyze the description of the items preferred by a particular user and then determine the principal common attributes (i.e. preferences), which distinguish these items. And then these preferences are stored in a user profile; this is the first basic principal of this technique. and the second is to compare each item's attributes with the user profile so that only items that have a high degree of similarity with the user profile will be recommended[2].there are two techniques have been used to generate recommendations in CB base recommendation. First technique generates recommendations heuristically using traditional information

retrieval methods, such as cosine similarity measure. And the second technique generates recommendations using statistical learning and machine learning methods, largely building models that are capable of learning users' interests from the historical data that is also known as training data of users.

## **2. COLLABORATIVE FILTERING-BASED RECOMMENDATION TECHNIQUES**

Collaborative filtering (CF)-based recommendation techniques gives recommendation based on the opinions of other people who share similar interests which helps people to make best choices [3]. There are two techniques of CF which are user-based CF and item-based CF [4]. In the first user-based CF approach, a user will receive recommendations of items liked by similar users and in the second approach which is item-based CF, a user will receive recommendations of items that are similar to those which having more preferred in the past. The similarity between users or items can be calculated by Pearson correlation-based similarity[5], constrained Pearson correlation (CPC)-based similarity, cosine-based similarity, or adjusted cosine-based measures. While calculating the similarity between items using the above measures, only users who have rated both items are considered. This can influence the similarity accuracy when items which have received a very small number of ratings express a high level of similarity with other items. By combining the adjusted cosine approach with Jaccard metric as a weighting scheme will improve similarity accuracy, which results in an enhanced item-based CF approach. the Jaccard metric was used as a weighting scheme with the CPC to obtain a weighted CPC measure and to calculate the similarity between users[6]. A multi-criteria collaborative filtering was developed to overcome the disadvantage of the single-rating based approach [7].

## **3. KNOWLEDGE-BASED RECOMMENDATION TECHNIQUES**

In Knowledge-Based (KB) recommendation which offers items to the users based on knowledge about the users, items and/or their relationships. Usually, the KB recommendations that describes how a particular item meets a specific user's need that retain a functional knowledge base recommendation, which can be performed based on inferences about the relationship between a user's need and a possible recommendation[8]. KB recommendation technique have Case-based reasoning is a common expression in which case-based recommender systems represent items as cases and it generate the recommendations by retrieving the most similar cases to the user's query or profile[9]. Ontology, represents the domain concepts and the relationships between those concepts as a formal knowledge representation method, which has been used to express domain knowledge in recommender systems[10]. On the basis of domain ontology semantic similarity between items can be calculated[11].

## **4. HYBRID RECOMMENDATION TECHNIQUES**

Hybrid recommendation technique is used to achieve higher performance and overcome the drawbacks of traditional recommendation techniques which combines the best features of two or more recommendation techniques into one hybrid technique has been proposed[12]. To build hybrids: weighted, mixed, switching, feature combination, feature augmentation, cascade and meta-level this seven basic hybridization mechanisms are combined and used in recommender systems as given in Burke[12]. To combine the CF recommendation techniques with the other recommendation techniques is the most common practice in the existing hybrid recommendation techniques which is used to avoid cold-start, sparseness and/or scalability problems.

## **5. COMPUTATIONAL INTELLIGENCE-BASED RECOMMENDATION TECHNIQUES**

Bayesian techniques, artificial neural networks, clustering techniques, genetic algorithms and fuzzy set techniques are included in computational intelligence (CI) techniques. To construct recommendation models these computational intelligence techniques are widely used in recommender systems. The classification problems can be solved by using a Bayesian classifier which uses a probabilistic methodology, which are popular for model-based recommender systems [13] which is often used to derive the model for CB recommender systems. In recommender systems When a Bayesian network is implemented, each node represents to an item, and the states represents to each possible vote value. In the network, there will be a set of parent items for each item which represent its best predictors. The combination of both CB and CF approaches is a hierarchical Bayesian network which has also been introduced as a framework [14]. The model-based recommender systems [13] constructed using An artificial neural network (ANN) which is an assembly of inter-connected nodes and weighted links that is inspired by the architecture of the biological brain. By using the back-propagation neural network method which train a three-layered neural network, Hsu et al.[15] used ANN to construct a TV recommender system. To generate precise

recommendations for movies A hybrid recommender system combines CB and CF which was proposed By Christakou et al.[16].

## **6. SOCIAL NETWORK-BASED RECOMMENDATION TECHNIQUES**

Considering the real world situation in which one's decision to purchase is more likely to be influenced by suggestions from friends than by website advertising, a user's social network may be an important source if it exists in a recommender system. Likewise, due to the inability of standard CF approaches to find sufficient similar neighbours in sparse data sets, users' social relationships are emerging as another improvement facet for recommender systems. In recent years, social networking tools in Web-based systems is grown rapidly which results in Social network analysis (SNA) recommender systems. Which helps in improving user experience, recommender systems increasingly provide users with the ability to engage in social interaction with other users, such as online friending, making social comments, social tags, etc. Systems whose rating data is too sparse to conduct collaborative filtering these trends offer opportunities, especially for making recommendations by utilizing users' social ties.

## **7. CONTEXT AWARENESS-BASED RECOMMENDATION TECHNIQUES**

Online social networks generates large amount of information which requires a effective recommender systems to give useful results. Traditional techniques ignore social relation data so it becomes inefficient, also existing social recommendation approaches not considered social context it only consider social network structure. It is really challenging to used the social contextual factors which are derived from users' motivation of social behaviors in to social recommendation. The context information includes the time and geometrical information, or the relationship with other people such as friends, families or colleagues. which has been recently considered in existing recommender systems; for example, the information obtained with the rapid growth of mobile handset use [17]. To recommend a vacation package or a personalized website it is not sufficient to consider only users and items. So in that case the contextual information provides additional information for recommendation generation. To recommend items to users in specific circumstances It is also important to used the contextual information in the recommendation process. For example, using the temporal context, a travel recommender system might make a very different vacation recommendation in winter compared to summer[18]. The contextual information about users in technology enhanced learning environments is also incorporated into the recommendation process [19].

## **8. GROUP RECOMMENDATION TECHNIQUES**

When group members are unable to gather for face-to-face negotiation, or their preferences are not clear in spite of meeting each other [20, 21], in that case Group recommender systems (GRS) are proposed to produce a group of user suggestions. GRS are also known as e-group activity recommender systems, and used into many domains including movies, music, webpages, events and complex issues such as travel plans. There are many strategies are used to aggregate all the members into a group, such as social choice theory and decision-making procedure. Masthoff [22] summarized eleven strategies including least misery, average, most pleasure and their adaptations, as the most common in GRS. Quijano-Sanchez et al. [23] used average strategy; PolyLens [24] used the least misery strategy [25]; MusicFX used a variant of the average without misery strategy; and Popescu [26] adopted the voting mechanism. There are also other strategies, like approval voting and sum, are also used in aggregation. Except for the aggregating methods, asynchronous and synchronous communications are also involved in GRS for multi-user support. In [27], an asynchronous communication mechanism for users was developed in which users in a group can view (and also copy) other embers' choices. McCarthy et al. [28] implemented asynchronous conversational system to produce ski holiday suggestions for groups.

## **9. KEYWORD-AWARE RECOMMENDATION TECHNIQUES**

A keyword-aware service recommendation method is proposed in this paper[29], which is based on a user-based Collaborative Filtering algorithm. Here, keywords extracted from reviews of previous users are used to indicate their preferences. It removes the challenges of traditional recommendation system that is Scalability and inefficiency problem. also it gives recommendations by taking the consideration of personal interest.

### 3. CONCLUSIONS

All existing recommender systems uses one or more of this basic techniques: content-based, collaborative, demographic, utility-based and knowledge-based. A Survey of these techniques shows that they have complementary advantages and disadvantages. also the Keyword Aware approach solves many of the drawbacks of traditional recommender systems. This fact has provided incentive for research in hybrid recommender systems that combine techniques for improved performance.

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