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Keyword Based Service Recommendation system for Hotel System using Collaborative Filtering.

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Abstract - *To provide appropriate recommendation to the user, service recommender system is a valuable tool. From last few years, increased number of customer, services and online information has grown widely, so that big data analysis problem has been occurred for service recommendation system. In traditional service recommender systems often suffer from scalability and inefficiency problems when processing or analyzing such large-scale data. The existing service recommender systems fails to meet users 'personalized requirements' because of there is presence of the same ratings and rankings of services to different users without considering diverse users' preferences.*

In this paper, we propose a Keyword-Based Service Recommendation system, to resolve the above challenges. It provides a personalized service by consideration of not only recommendation list but also recommending the most appropriate services to the users effectively. To generate appropriate recommendations, user's preferences as well as user-based Collaborative Filtering algorithm is adopted.

***Key Words*: Big data, big table, keywords, recommendation system, thesaurus, user preference**

1. INTRODUCTION

The amount of data in our world has been increasing explosively and analyzing large data sets is called "Big Data" become a key basis of competition underpinning new waves of productivity growth, innovation, and consumer surplus[1]. Big data is a broad term for data sets so large or complex that traditional data processing applications are inadequate. Challenges include analysis, capture, data creation, search, sharing, storage, transfer, visualization, and querying and information privacy. Today, Big Data management stands out as a challenge for IT companies. The solution to such a challenge is shifting increasingly from providing hardware to provisioning more manageable software solutions [2]. Big data also brings new opportunities and critical challenges to industry and academia [3] [4]. Similar to most big data applications, the big data tendency also poses heavy impacts on service recommender systems. With the increasing number of alternative services, effectively recommending services that users preferred have become an important research issue. Service recommender systems have been shown as valuable tools to help users deal with services overload and provide appropriate recommendations to them. Examples of such practical applications include CDs, books, web pages and various other products now use recommender systems[5][6][7]. Over the last decade, there has been much research done both in industry and academia on developing new approaches for service recommender systems.

To provide appropriate recommendation to the user, service recommender system is a valuable tool. From last few years, increased number of customer, services and online information has grown widely, so that big data analysis problem has been occurred for service recommendation system. In traditional service recommender systems often suffer from scalability and inefficiency problems when processing or analyzing such large-scale data. The existing service recommender systems fails to meet users 'personalized requirements' because of there is presence of the same ratings and rankings of services to different users without considering diverse users' preferences. Motivated by these observations, in this paper, we address these challenges through the following contributions:

- A keyword-based service recommendation method is proposed in this paper, which is based on a user-based Collaborative Filtering (CF) algorithm.

- In this, keywords extracted from reviews of previous users are used to indicate their preferences [13].

Recommendations are offered as ranked list of items. In performing this ranking, recommender systems try to predict what the most suitable products or services are, based on the user's preferences and constraints.

2. LITERATURE REVIEW

While processing or analyzing large scale data the service recommendation system suffer from the scalability and inefficiency. In the current existing recommender system provides rating and ranking of services without bothering of diverse user's preference list .Because of this reason they are failed to meet users personalized requirement. Moreover, in most existing service recommender systems, such as hotel reservation systems and restaurant guides, the ratings of services and the service recommendation lists presented to users are the same. They have not considered users' different preferences, without meeting users' personalized requirements.
Recommendation carried out by different ways:

2.1 Content-based approaches.

Content based recommenders provide recommendations by comparing representation of contents describing an item or a product to the representation of the content describing the interest of the user. They are sometimes referred to as content based filtering [9]. Content based recommendation system is nothing but to get form from the content of item. In most of the cases they are the words which portray the item. This recommendation system is able to introduce new item for the user. It recommending item along with explanation of item to the user. The main motto of this method is to analyze the bunch of document of items, which is rated by the user and construct a model according to the user interest which is based on feature of the items. Information retrieval and information filtering both are the source of content based recommending approach. It provides only textual information like as news webs and documents. No content-based recommendation system can provide suitable suggestions if the analyzed content does not contain enough information to discriminate items the user likes from items the user does not like[9]. Some representations get only certain views of the content, but there are many others that would influence a user's experience.

2.2 Collaborative recommendation approaches.

Collaborative filtering approaches recommend services [5] is well known Preferred by user in the past. Collaborative filtering method is most important method in recommendation system, in which it finds a set of people who shares same interest with you. These people could be determined by the similar ranking on items. These people identified by neighborhood of the current user. Collaborative filtering use's "Netflix". If any recommendation system gives rating on item then it might be using collaborative filtering method. First problem is that result of recommendation system will be depends on presence of information. In the relationship mining, new items not-yet-rated can be abandoned in the recommendation processes. Second problem is that, the collaborative filtering unable to cover the extreme case. Similarity decisions are unable to be established when the scales of the users are small or the users have unique taste. Update frequency is the third problem. If any new information of users has to be included in the recommendation processes in real time, data latency will increase the waiting time for the query result [5].

2.3 Big data.

Big data is nothing but one kind of the dataset whose size is greater than that of the typical database which is used to capture, store, manage and analyze the data. Sweating of data is carried out in every industry and business so that it becomes important factor of production. Now days, the use of big data will be responsible for competition and growth of individual firm [10]. Due to wide use of digital technology , there is rapidly growth in the digital data in every organization .Digital network contain the large number of users, devices and sensors which are interconnected to each other and as time passes they are continuously rising so that ability to generate, communicate ,share and access the data has been revolutionized.

2.4 Big Table

Big table is a distributed storage system for managing structured data that is designed to scale to a very large size: peta bytes of data across thousands of commodity servers. Many projects at Google store data in Big table, including web indexing, Google Earth, and Google Finance [8]. Data in the table is organized in three dimensions which are row, column and timestamp.

3. METHODOLOGY

3.1 Introduction

Keyword- based service recommendation method keywords are used to indicate both of users' preferences and the quality of candidate services. A user-based CF algorithm is adopted to generate appropriate recommendations. It aims at calculating a personalized rating of each candidate service for a user, and then presenting a personalized service recommendation list and recommending the most appropriate services to user. Just consider service as hotel reservation system. As shown in Fig 1 while reserving any hotel we are considering so many things like room service, quality of food, cleanliness of hotel and its environment, etc. Requirements of hotels are depending on customer, as person changes there requirement also changes. Some people more concern about cleanliness of hotel not bothering about value, transportation facilities. But on the

other hand some people interest in value. Rectangles contain main keywords and oval contain related words of that keyword. The user may put the requirement as "he/she want mall near to hotel" instead of "shopping". So that, we are applying domain treasures on the keyword. Because of that we can easily get the related words of keyword which will be our candidate list1.

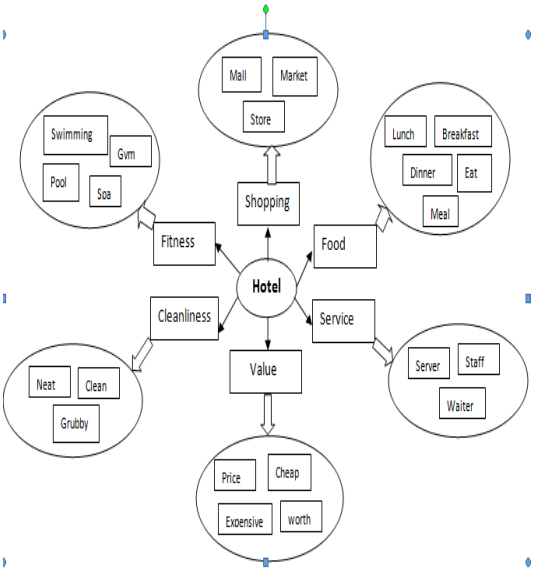

Fig -1: Hotel System

3.1.1 Keyword-candidate list:

The keyword-candidate list is a set of keywords about users' preferences and multicriteria of the candidate services, which can be denoted as K= {k1; k2;...kn}; n is the number of the keywords in the keyword-candidate list. An example of a simple keyword-candidate list of the hotel reservation system is described. Keywords in the keyword-candidate list can be a word or multiple words related with the quality criteria of candidate services[13].

3.1.2 Domain thesaurus:

A domain thesaurus is a reference work of the keyword-candidate list that lists words grouped together according to the similarity of keyword meaning, including related and contrasting words and antonyms[12][13]. An example of a simple domain thesaurus of hotel reservation system .The words in the red rectangle are the keywords in the corresponding keyword-candidate list, and the words in the ovals are the related words of the keywords. Often, domain thesauruses are updated regularly to ensure the timeliness of the words.

3.2 Proposed Work

In this project, we propose a keyword-based service recommendation method,. In this, keywords are used to indicate users' preferences, and a user based. Collaborative Filtering algorithm is adopted to generate appropriate recommendations. More specifically, a keyword- candidate list and domain thesaurus is provided to help obtain users' preferences. The active user gives his/her preferences by selecting the keywords from the keyword candidate list, and the preferences of the previous users can be extracted from their reviews for services according to the keyword-candidate list and domain thesaurus. Our method aims at presenting a personalized service recommendation list and recommending the most appropriate service to the users. Finally, the experimental results demonstrate that KBSR significantly improves the accuracy and scalability of service recommender systems over existing approaches.

3.3 Proposed Methodology

3.3.1 Capture user preferences by a keyword-aware approach.

In this step, the preferences of active users and previous users are formalized into their Corresponding preference keyword sets respectively. In this project, an active user refers to a current user needs recommendation.

Preferences of an active user: An active user can give his/her preferences about candidate services by selecting keywords from a keyword-candidate list, which reflect the quality criteria of the services he/she is concerned about.

Preferences of previous users: The preferences of a previous user for a candidate service are extracted from his/her Reviews for the service according to the keyword-candidate list and domain thesaurus .And a review of the previous user will be formalized into the preference keyword set of him/her.

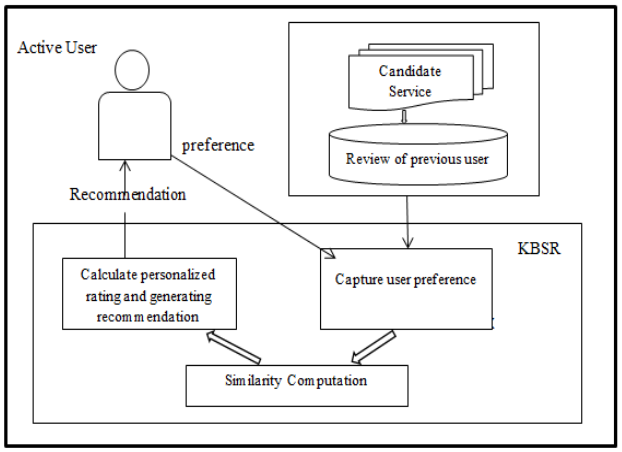

Fig -2: Main steps of KBSR System

The main steps of KBSR are depicted in Fig. 2, which are described in detail as follows: , Our system provide candidate keyword list so current users can select keyword

like food, transport, hospitality etc. from given preference list as shown in Fig. 3.

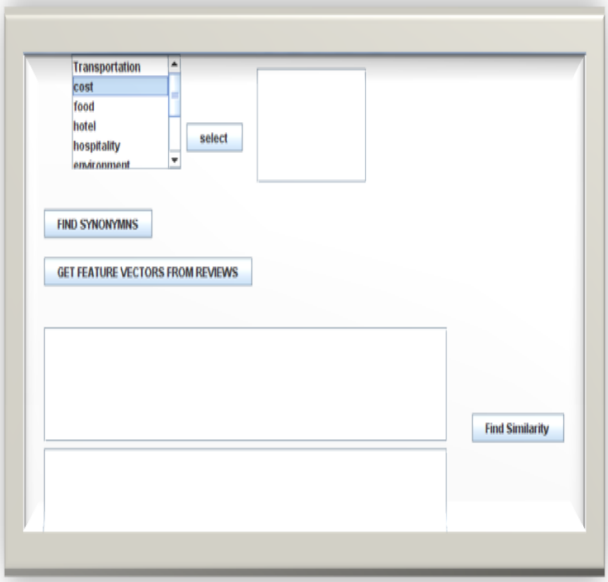

Fig -3: Current user can select keyword from given list of services

In Fig 4 , keyword selected by active user will goes to the text area which will consider as active user preference list.

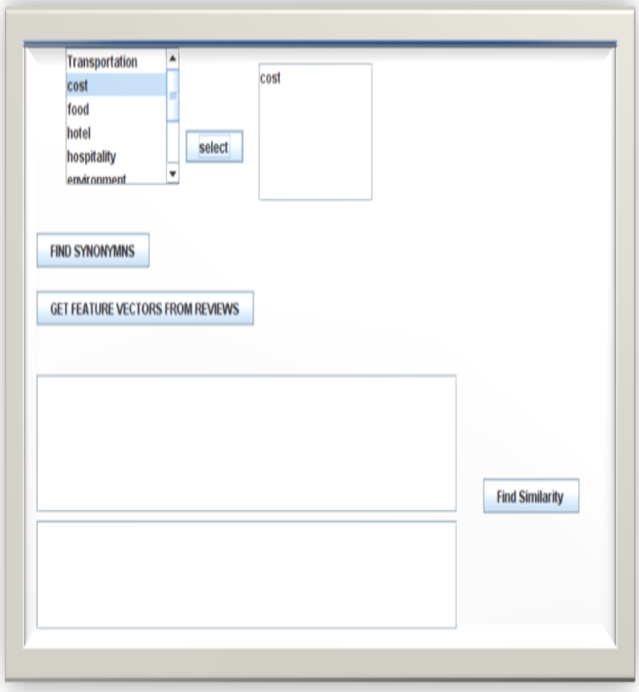

Fig -4 Select service from given list

In Fig 5, keyword selected by active user from preference list can search for synonyms using word net dictionary.

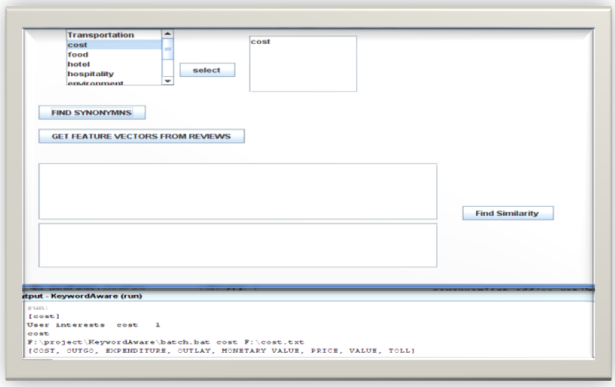

Fig -5: Synonymns of selected keyword

In Fig 6 in first text area the extracted keyword with their count is display which was taken by previous users review. In second text area jaccard coefficient displayed with the help of jaccard coefficient similarity computation algorithm

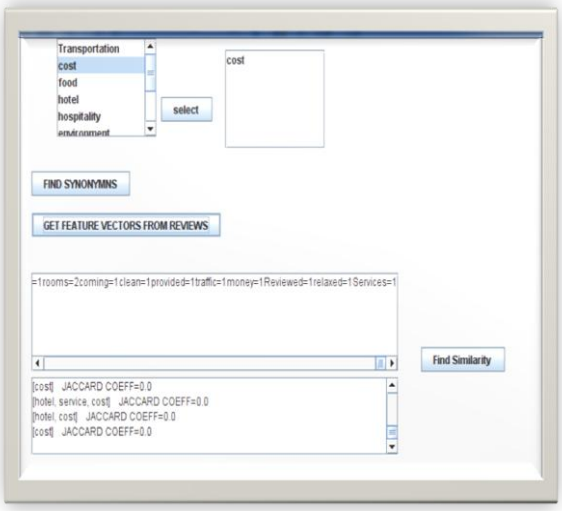

Fig -6: Review extraction and computing similarity

3.3.2 Similarity computation.

The second step is to identify the reviews of previous users who have similar tastes to an active user by finding neighborhoods of the active user based on the similarity of their preferences. Before similarity computation, the reviews unrelated to the active user's preferences will be filtered out by the intersection concept in set theory. We are using word net dictionary for finding synonymous of keyword which are presenting active user preference list If the intersection of the preference keyword sets of the active user and a previous user is an empty set, then the preference keyword set of the previous user will be filtered out [14].

3.3.3 Calculate personalized ratings and generate recommendations.

Based on the similarity of the active user and previous users, further filtering will be conducted. Once the set of most similar users are found, the personalized ratings of each candidate service for the active user can be calculated. Finally, a personalized service recommendation list will be presented to the user and the service(s) with the highest rating(s) will be recommended to him/her [14]. .

4. CONCLUSIONS

We have proposed a keyword-based service recommendation method, named KBSR. In KBSR, keywords are used to indicate users' preferences, and a user based Collaborative Filtering algorithm is adopted to generate appropriate recommendations. More specifically, a keyword-candidate list and domain thesaurus are provided to help obtain users' preferences. The active user gives his/her preferences by selecting the keywords from the keyword-candidate list, and the preferences of the previous users can be extracted from their reviews for services according to the keyword-candidate list and domain thesaurus. Our method aims at presenting a personalized service recommendation list and recommending the most appropriate service to the users.

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