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Eatery Directory Using Recommendation System and Data Mining

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Abstract: *Many recommender system has been developed in recent years which recommends the users based on reviews such as Zomato, Netflix etc. but there is a dearth of such system developed for local eateries hotspot in a particular area. In this project, a local food eatery recommender system is built based on reviews, likes and data mined from different websites, blogs and social media such as Facebook, Twitter etc. We are using different API's for extracting data from social media such as Graph API for Facebook, Tweepy for Twitter etc. On the data extracted we are using collaborative filtering technique and ranking algorithm for recommending the eatery hotspot based on reviews and likes. This system developed can prove as a boost to the sales of Eatery hotspot thus could have monetary benefits for both the developers and the eatery hotspot owner. This system currently shows just the directory of the eatery but can further be extended for online booking and home delivery of the food.*

Keywords: *Collaborative filtering, Graph API – Application Program Interface,Mining, Recommendation system, Tweepy.*

I. Introduction

Recommender systems are used to provide personalized recommendations according to user profile and previous behaviour. Recommender system are widely used in the Internet Industry. Services like Amazon, Netflix, and YouTube are typical examples of recommender system user. Recommender system not only help the users find their favourite products but also bring potential profit to online service provider.

In today's time the food industry is growing at a huge pace. Out of which the knowledge about the road side food stalls is missing which causes the demand for having a complete information software that would have all the information of the un-sectored food industry. Because a standalone information system without any review or recommendation has no sense, there was also a need to fetch information from the real-time world. This need can be achieved by data mining and recommendation systems which will be able to recognize the users review about a particular eatery hotspot. Because of this, various recommendation algorithms have been developed and ranking techniques are used to find the rank of the organizations based on the reviews of users.

Recommender Systems (RS) have been a centre of attraction in fields of both academia and industry, these systems very precisely help to organize information by autonomously gathering information and to alter it down to individual interests like what is the best camera to buy (Amazon.com), which is the best hotel to stay in (Trip Advisor), and in similar way to find which is the best local eatery hotspot in a locality. Recommender system usually recommends its users based on two approaches. One is collaborative filtering technique and another is content based filtering technique or personality-based approach [1]. Collaborative filtering technique is based on predictions and recommendations on the ratings, reviews or behaviour of other users in the system. Another is content based filtering technique wherein system recommends its users based on its previous behaviour such as finding similar items liked by users previously [2].

II. Background

Collaborative filtering techniques perform well when there is sufficient rating information [3]. However, their effectiveness is limited when the well-known rating sparsity problem occurs, due to the poor coverage of recommendation space [4], or the difficulty in letting users express their preferences as scalar ratings on items [5]. To solve this problem, content based recommender approach is developed which recommends the similar items to the targeted users that have been liked by the users.

Basically, this method uses an item characteristics (i.e., different set of particularities like what particular food item the shop is selling, list of facilities available, etc.) differentiating them within the system. The system thus makes a profile of users which is content based on a weighted vector of item characteristics.

The weights shows the significance of each feature to the user and can be calculated from individually rated content vectors using a different techniques.Naive approaches use the mean values of the rated item vector while other cosmopolitan methods make use machine learning methods like cluster analysis,Bayesian Classifiers, decision trees, etc. so as to find or asses probability whether it will be praised by the user or not[6]. First hand feedback from the end uses in the form of dislike or like tags can be used for importance for certain attributes so as to assign higher or lower weights.

III. Related Work

There are various systems designed for recommending different movies, music, products, restaurants, cinemas etc. based on the reviews given by the users and also from different websites, social media and blogs written by the users. Some systems are standalone systems such as Zomato for recommending only restaurants whereas some systems are hybrid systems such as JustDial which recommends the user in the field of user's interest such as restaurants, cinemas, schools etc. but there is dearth in such standalone system developed for roadside food eatery which is considered under un-sectored food industry. There are many users who considers eating roadside food rather than eating in big restaurants because of certain parameters such as prices, taste of the food etc. Hence this system is completely developed for the eatery hotspots of a particular region to give the users a complete directory of the eatery hotspot and also help vendors by giving them internet based platform for mass attractions.

IV. Proposed Model

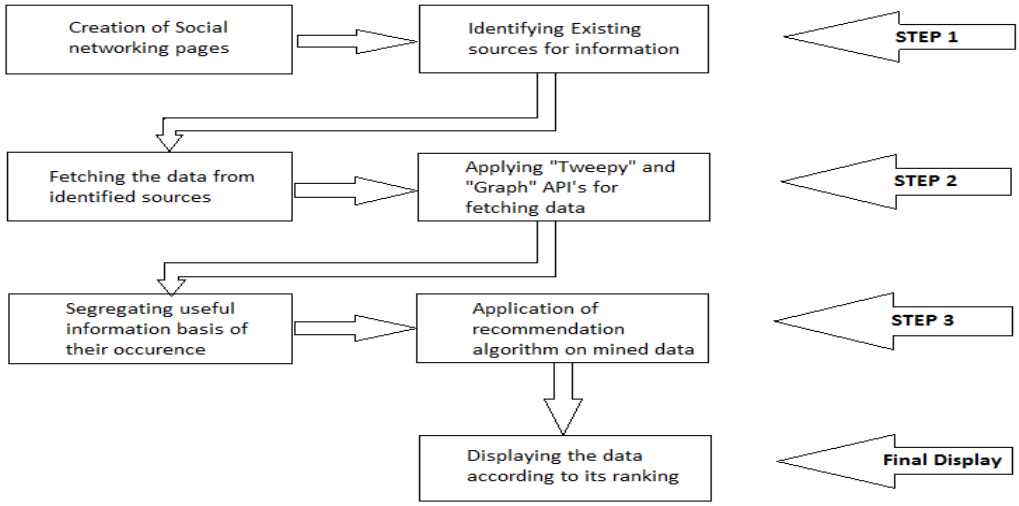

Figure 1: Block diagram of the proposed system

4.1 Information Gathering

First step of the system is to gather information such as reviews, likes, comments from different sources such as websites, blogs and social media like Facebook, Twitter etc. of a local eatery in a particular area.

4.2 Mining

After collecting information from the step 1, we apply different techniques for extracting data from the information gathered. We have used Twitter's python API "Tweepy" and Facebook's "Graph" API for extracting data from these social media.

4.3 Identification of Appropriate information and recommendation

After collection of data based on the type of input generated in terms of number of times the Keyword mentioned or say the ratings on a particular scale we will decide the parameter for scaling the data.Application of Recommendation algorithm on the data mined, which will in turn provide a ranking based on the number of times of its occurrence.

4.4 Final Display

This is the final stage where the required data from the user will be displayed with the recommendations.

V. Demonstration And Result

Characteristics of users is used byContent-based recommender systems which are created at the beginning (mined data). Knowledge about a user and his liking for a particular eatery is included in the profile. Liking is generally based on how the user ratesdifferent items. Generally, when a profile is created, surveys are made by recommender systems, to get initial knowledge about a user so as to escape the problems faced by new-user. [7]

For the existing user, collaborative filtering technique can be used wherein the most reviewed eatery is recommended to the user of a particular area depending upon the most famous and highly rated eatery hotspot of that area. In the process of recommending a eatery, the system precisely compares the eateries that were already admirably rated by the end user with the eateries that they avoided to provide and to find resemblance. Those eateries will be recommended to the user that weremostly similar to the admirably rated ones. Table 1 shows illustrations of a end users liking with the eateries that a particular user has visited and the ratings that the user provided. Table 2 depicts the list of eateries and their attribute-values. This system would evaluate eateries from the database (Table 2) that the user has admired and payed a visit. Then, comparisonswill be made between those eateries with the remaining eateries from the database (Table 2) and find resemblance. The userwill thus be recommended with similar eateries. In the current example, it can be observed that there is a eatery"Raj Snacks" similar to the eatery "Ram foods" that the user admired. The user avoided "Khana Khazana" so it will not be recommended to him/her.

Table 1: Eateries user has visited and their ratings

Eateries	Raj Snacks	Ram Foods	Khana Khazana	Delight centre
Ratings	9	10	8	6

Table 2: Eatery list with their attributes

Eateries	Quality	Value for money	Hygiene	Choice of Food
Raj Snacks	10	9	8	10
Prem eatery	7	8	6	9
Amar food centre	8	7	10	9
…	…	…	…	…

A variety of algorithms are available for measuring resemblance among eateries present in a data base as well as in user'slikings. [8] 'Cosine similarity' is one of the many approaches present. Eateries are represented as vectors on a coordinate plane where angle between the different eatery vectors is calculated, which thus gives the value cosine angle between them. Vectors c and s of two entities along with their properties are evaluated in their cosine similarity function with the following equation: [9]

$$u(c,s) = cos(\vec{w_c}, \vec{w_s}) = \frac{\vec{w_c} \cdot \vec{w_s}}{||\vec{w_c}|| \times ||\vec{w_s}||} = \tag{1}$$

$$= \frac{\sum_{i=1}^{K} \vec{w_{ic}} \vec{w_{is}}}{\sqrt{\sum_{i=1}^{K} \vec{w_{ic}^2}} \sqrt{\sum_{i=1}^{K} \vec{w_{is}^2}}}$$

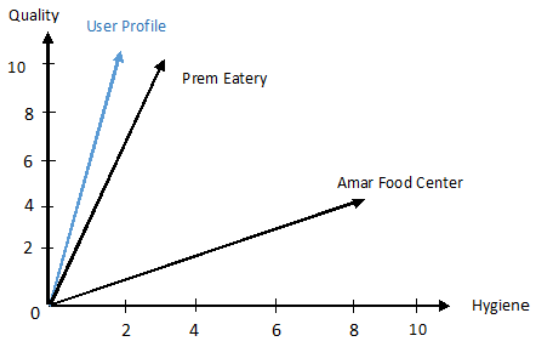

Figure 2: Cosine similarity on a coordinate plane

VI. Conclusion And Future scope

This system thus provides an effective form of searching street food of a particular area by using collaborative filtering recommendation techniques and algorithms. Different systems have been developed for recommending different restaurants, music etc. but these system targets local eateries hotspot of a particular area specifically.

This report presented a detailed explanation of the proposed system of how the User can search for a particular food stall and also provide recommendations and reviews which will be used for ranking the food stalls. We have used different API's for mining data from different social networking sites such as Facebook, Twitter using 'Graph API' and 'Tweepy' and then applying recommendation system techniques on the extracted data and recommend the eatery based on its ranking. This system developed can prove as a boost to the sales of Eatery hotspot thus could have monetary benefits for both the developers and the eatery hotspot owner.

This system currently shows just the directory of the eatery but can further be extended for online booking and home delivery of the food.

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