International Journal of Multidisciplinary and Scientific Emerging ResearcH (IJMSERH)

| ISSN: 2349-6037 | www.ijmserh.com ||ijmserh@gmail.com |

|| Volume 6, Issue 2, April 2018 ||

Tourist Place Recommendation System Using Machine Learning

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ABSTRACT: Recently, the tourist business has become more and more popular. More and more tourists prefer to use Internet services to book hotels, buy flights, and search attractions to see instead of booking complete tours. In this regard, information retrieval systems, which allow finding information about the tourist trip and provide the tourist interested information during the trip, are becoming more and more popular. The most valuable systems support online information. Recommendation systems can be defined as a software that is used to generate personalized recommendations and guess the user's preferences and interests, based on the users' current and past behavior. Currently, tourists use several recommender systems to find new destinations for their holidays. However, the results gathered from such systems might be misleading sometimes, it does not meet the tourist's expectations. Recommender system plays the role of generating suggestions by collecting user information such as preferences, interests, and locations. A tourist needs to plan his trip by selecting a destination and the different points of interest (PoIs) to visit. He generally uses information from travel agencies, travel book guides and websites to organize his trip. Using internet, the tourist has an easy access to large amounts of travel information. The huge volume of available information about destinations, leisure activities and the previous reviews of other travelers turned the trip planning into a very challenging and time consuming task. The tourist gets eventually overwhelmed and he may have serious difficulties to discern the more interesting PoIs from the rest. The purpose for building the project is that the user can receive all the information regarding that place under one roof. Also the user will be recommended with the new places based on the places he reviews on the system.

KEYWORDS: Machine Learning, Histograms, Content based recommendation, Image based searching, Feature Engineering, Performance Analysis, Feature Extraction, Machine Learning Algorithms.

I. INTRODUCTION

With recent advances in internet applications and widespread communication technologies, customers are able to share their travel or purchase experiences, feelings, and reviews online. These online reviews play a vital role in acquiring tourism-related services. Our proposed recommendation system contributes towards sustainability in two primary ways. First, it prioritizes travelers' satisfaction, views, and experiences also to visit nearest place from user's current location so as to minimize expenditure of the tour. For tourism sustainability, the aim is to provide the most enjoyable and satisfactory experience in order to increase the number of satisfied travelers who would like to come back and will recommend the destination to others which is more nearer to them.

Our goal is to focus on discovering under-emphasized locations and top-ranked locations to attract tourists. The need was that we felt to develop the website where people can search for the place they want to visit in a convenient manner. Here the user can search the place based on the image and he/she will be provided with all the facilities needed. The main theme of our project is the image based search mechanism. The system also provides an alternative option of searching the place based on the ratings mechanism. The main advantage of the system is to reduce the time of the user by displaying all the relevant information regarding the place he/she searched under one roof. Also to provide the user with places based on the ratings mechanism. When the user has been registered to the system, all the information will be stored to the database and the user will be provided with the user-id and password. After the user logs in to the system he will be able to access the recommendation system Once logged to the system, the user will be able to search the place he wants to visit. The user will also be able to rate the places he has visited previously. On that ratings, the system will be recommended with new places similar to the places the user has rated. The main purpose of our project is to provide a user-friendly web portal for our customers for tourist place recommendation. This idea had been implemented long back, but it is based on customer's reviews. Sometimes it may lead to disappointment according to user's perspective. Also, there are lot of systems which may false lead to tourist based on the review. Our system tries to predict the tourist place based

on the interest of tourist and place which is nearer from current location of user.

II. RESEARCH METHODOLOGY

The system architecture of the Tourist Place Recommendation System is represented below. The user must log in to the system to be able to access the system. Otherwise the user has to register itself to the system from where he/she will get the username and the password to access the system. To view the information about services provided by owner of system user can visit to home page of system. Where user can see about famous places also user can perform image based search which will provide user a guideline for planning tour to one of famous places in our country. All the information the user has filled will be stored in a database. Once logged to the system, the user will be able to search the place he wants to visit. The user will also be able to rate the places he has visited previously. On that ratings, the system will be recommended with new places similar to the places the user has rated.

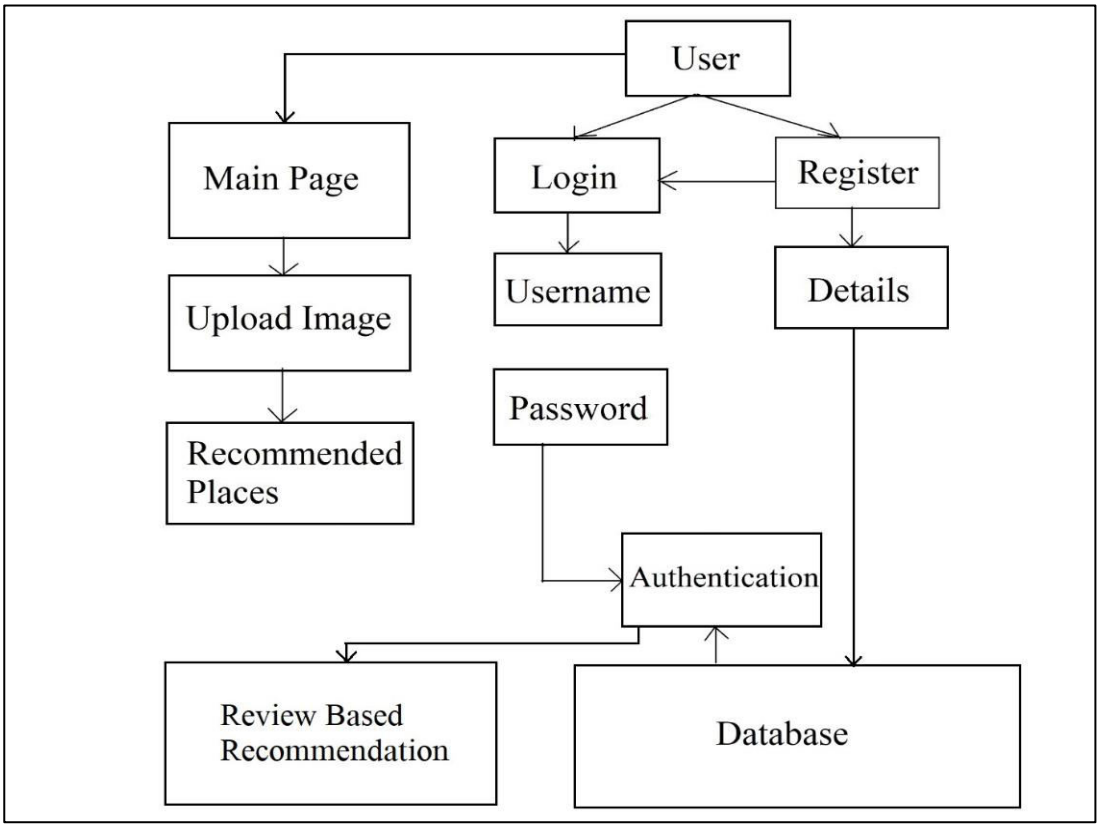

Diagram is based on three parts as shown as User interface, Recommendation Machine and Dataset with help of user interface user will try to find location based on his criteria of liking or location given location by user. Based on users input data is generated using hybrid combination of collaborative filtering (CF), the content-based filtering (CB). In most of the recommendation processes, using collaborative filtering, the reference algorithm used is k Nearest Neighbors (KNN) recommendation algorithm. KNN recommendation algorithm is simple and reasonably produces accurate results. Items recommendation is predicted for the user. Then, from the top-n recommendations, n items are chosen to satisfy the particular active user. For capturing data, we will use data crawler and based on that we will convert data into a structured data. Our dataset consists of combined set of user rating data and distance-based data. The data is predicted based on dataset the machine access the dataset and trains model based on reviews and based on distance. Then it will return results to user interface so that user can access those results easily.

First the user has to register himself to the system if he is the new user. Once registered the information will be

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stored to the database. The user will be provided with user-id and the password, with the help of this he can log in to the system. When the user logs in, he will be displayed with main page from where he can upload the image of the place which he wants to search. The system will then fetch the data from files and analyze the image data. Based on that analysis the system will display all the relevant information regarding that image

III. IMPLEMENTATION

The new users are allowed to register to our system. there will four fields as user name, password, phone number, which all have to be inserted by user itself. Register button will be used to save data. If user does not enter any of credential, then it will again redirect that user to registration page. After Successful registration user will be redirected to login page for further login process. It includes username and password fields which are needed to be filled up by registered user. If user enters wrong credentials it is not allowed to proceed further. After successful login user will be redirected to our main page which allows user to get to know mostly visited cities of our country. Also user will be able to get information about mostly visited tourist places with help of Image search method. Recommendations will be given after user logs in into our system. User needs to upload an image of one of famous place. After uploading image, the information about that place will be shown to the user along with various features like accommodations, nearby places to visit, weather When user uses our Image based recommendation user will be able to information of that place along with the nearby places to be visited with that user will be able to know about weather conditions of that place. User can also look for accommodation to visit that city.

Algorithm:

To recommend place based on overall reviews

1. Importthedatafromdatasetincsvformat.
2. Get a count of user_ids for each unique place as recommendation score.
3. Sort the place based upon recommendation score
4. Generate a recommendation rank based upon score
5. Get the top 10 recommendations

```
train_data_grouped = self.train_data.groupby([self.item_id]).agg({self.user_id: 'count'}).reset_index()
train_data_grouped.rename(columns = {'user_id': 'score'},inplace=True)
print(type(self.train_data))
#print("Trained data grouped",train_data_grouped)

train_data_sort = train_data_grouped.sort_values(['score', self.item_id], ascending = [0,1])


train_data_sort['user_id'] = train_data_sort['score'].rank(ascending=0, method='first')
#print("SORTED TRAINED DATA",train_data_sort)
self.popularity_recommendations = train_data_sort.head(10)
```

Recommend Places based on user's previous response

1. Importthedatafromdatasetincsvformat.
2. Add user_id column for which the recommendations are being generated. Bring user_id column to the front. Sort the place based upon recommendation score.
3. Get unique items (place) corresponding to a given user.
4. Construct co-occurrence matrix. Initialize the item cooccurence matrix of size len(user_place) X len(place)
5. Calculate a weighted average of the scores in cooccurence matrix for all user place
6. Get the top recommendations

```
def construct_cooccurence_matrix(self, user_place, all_place):
    user_place_users = []
    for i in range(0, len(user_place)):
        user_place_users.append(self.get_item_users(user_place[i]))
    cooccurence_matrix = np.matrix(np.zeros(shape=(len(user_place), len(all_place))), float)
    for i in range(0,len(all_place)):
        place_i_data = self.train_data[self.train_data[self.item_id] == all_place[i]]
        users_i = set(place_i_data[self.user_id].unique())
        for j in range(0,len(user_place)):
            users_j = user_place_users[j]
            users_intersection = users_i.intersection(users_j)
            if len(users_intersection) != 0:
                users_union = users_i.union(users_j)
                cooccurence_matrix[j,i] = float(len(users_intersection))/float(len(users_union))
            else:
                cooccurence_matrix[j,i] = 0
    return cooccurence_matrix
```

```
def get_item_users(self, item):
    item_data = self.train_data[self.train_data[self.item_id] == item]
    item_users = set(item_data[self.user_id].unique())

    return item_users
```

IV. CONCLUSION

Hence, by deploying various recommendation techniques based on co-occurrence matrix, we were able to predict the tourist places based on overall reviews given by users along with reviews given by one user to make it as personal recommender. As our project was intended for to study how content based filtering works and how we can make personal recommendations based on previous responses of single user, this is deemed useful for analysis about how to make content based filtering based on the given data about tourist places. The user will also be able to rate the places he has visited previously. Based on that the system will be able to recommend the new places to the user.

V. FUTURE WORK

This software can be used to predict the tourist places that are included into dataset by system owner. Further, the analysis made by the software could be used to plan trips in more economical way than normally people used to do on random search. Travel Agencies or Trip Planning companies can use this software to know the various tourist spots. This system can be deployed in states from which system owner can gather data about tourist attractions easily. Currently, we are analyzing the data from only two states. However, this can be extended to multiple states and union territory. Another potential future direction is to set up a cloud based containerized application that will be accessible from any system rather than having it from local system.

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|| Volume 6, Issue 2, April 2018 ||

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