



## “Tourism Recommendation System Based on Decision Tree”

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### Abstract:

In the past few years, with the proliferation of mobile devices people are experiencing frequent communication and information exchange. For instance, in the context of tourist visits, it is often the case that each person carries out a smartphone, to get information about touristic places. When one visits some location, a tourist guide application will recommend useful information, according to its current location, preferences, and past visits. Afterwards, the tourist guide allows for the user to provide feedback about each visit. In this paper, we address the development and the key features of a tourist guide, named Guide Me. Its mobile and Web applications provide consultation, publication, and recommendation of touristic locations. Each user may consult places of touristic interest, receive suggestions of previously unseen touristic places according to other user's recommendations, and to perform its own recommendations. The recommendations are carried out using the well-known Mahout library. As compared to previous recommender-based tourist guides, the key novelties of Guide Me are its integration with social networks and the unique set of options offered in the application. The usability and load tests performed to evaluate the service, including its recommendation engine, have shown both the adequacy of the designed interfaces as well as good response times. In this project we are building recommendation system for tourists using decision tree to predict best restaurants for given food. User will give food name as input and then application will extract all restaurants which is serving that food and its ratings and then build a recommendation model by using all users' reviews and ratings.

### Introduction:

Every day, many people visit well-known touristic locations around the world. However, many unknown places deserve to be visited but people don't know about their existence, due to the lack of public information. Many points of interest may be located within a range of dozens of kilometres from our homes, but usually we prefer to travel hundreds or even thousands of kilometres to visit some other well-known locations. Recently, with the proliferation of smart phones and social networks, people got closer. Usually, people carry out a mobile device, being able to gather information about their surroundings, which is used by the so-called tourist guide applications to suggest touristic attractions, based on context factors such as location, weather conditions, and available time.

### Recommender System:

In order to provide quality recommendations for our users, we have used the Apache Mahout

Recommendation Engine library. Mahout provides several CF algorithms, for user and item-based recommendations. Nowadays, this library is widely used for the implementation of RS. As we have discussed in Section 3, due to the reasonably good compromise between algorithm performance and drawbacks, and taking into consideration the relatively small size of our database, which, in this first prototype, includes only points of interest from Portugal, we have chosen the IBCF approach for our RS. The RS is implemented with the Slope One algorithm and scheduled to run every day at 3:00 AM. The service obtains list of users who are eligible (those that have visited at least one location) for recommendations. For performance reasons, the new recommendations for each user are computed solely after the user had an increase of 5% in the number of visited locations. A fast recommendation process is achieved, by dividing

eligible users in equal subsets, which are processed in separate threads.

**To implement this project, we have designed following modules:**

**Upload Tourist Dataset:** using this module we will upload tourist dataset for restaurant reviews and ratings.

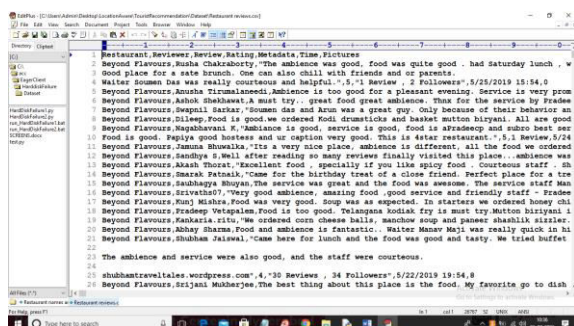
**Extract Reviews, Rating & Service Data:** using this module we will read all reviews, ratings and services and then remove stop words and special symbols from dataset to clean reviews and then build a training dataset vector.

**Extract Features:** using this module we will extract words/features from each review and then build TFIDF (term frequency inverse document frequency) training vector. Training vector will replace each words with its average frequency.

**Run Decision Tree Algorithm:** using this module we will train above training vector with decision tree and then build a recommendation model.

**Predict Recommendation:** this module accept input from user and then predict restaurant recommendation based on given input.

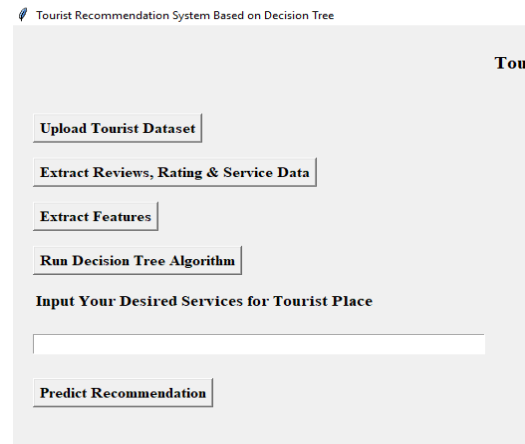
To implement this project, we have used below reviews and ratings dataset and this dataset is available inside 'Dataset' folder.



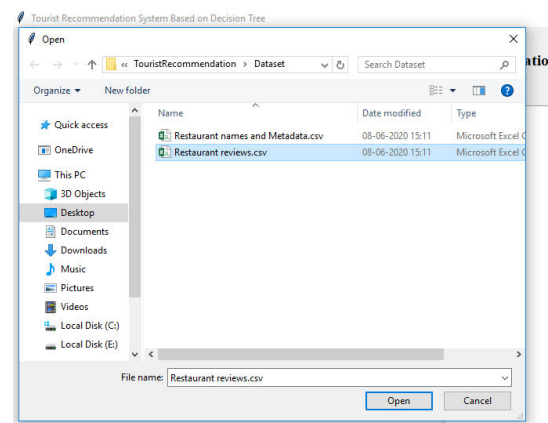
In above dataset screen shots first row contains dataset column names and remaining rows contains dataset values like restaurant name, reviews, ratings etc. so by using above dataset we will trained decision tree algorithm and then perform recommendation.

### Screen Shots:

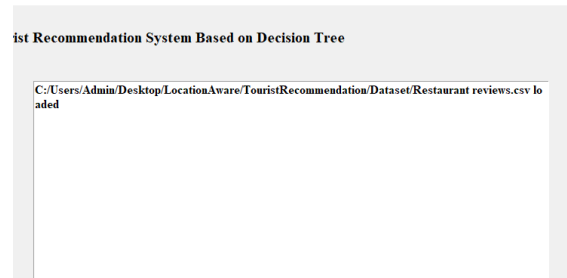
To run project double click on 'run.bat' file to get below screen



In above screen click on 'Upload Tourist Dataset' button to upload dataset



In above screen selecting and uploading 'Restaurant reviews.csv' file and then click on 'Open' button to load dataset and to get below screen



In above screen dataset loaded and now click on 'Extract Reviews, Rating & Service Data' button to read reviews and then build training vector

records and application using 3999 records for training and 1000 records for testing. Now numeric training vector is ready and now click on 'Run Decision Tree Algorithm' button to train decision tree with above training vector and to get below screen:

**Tourist Recommendation System Based on Decision Tree**

Rusha Chakraborty Gave Rating : 5.0  
Location Name : Beyond Flavours  
Given Reviews : The ambience was good, food was quite good . had Saturday lunch , which was cost of fective .  
Good place for a sate brunch. One can also chill with friends and or parents.  
Waiter Soumen Das was really courteous and helpful.

Anusha Tirumalaneedi Gave Rating : 5.0  
Location Name : Beyond Flavours  
Given Reviews : Ambience is too good for a pleasant evening. Service is very prompt. Food is good. O ver all a good experience. Soumen Das - kudos to the service

Ashok Shekhawat Gave Rating : 5.0  
Location Name : Beyond Flavours  
Given Reviews : A must try.. great food great ambience. Thnx for the service by Pradeep and Subroto. My personal recommendation is Penne Alfredo Pasta) ..... Also the music in the background is amazi ng.

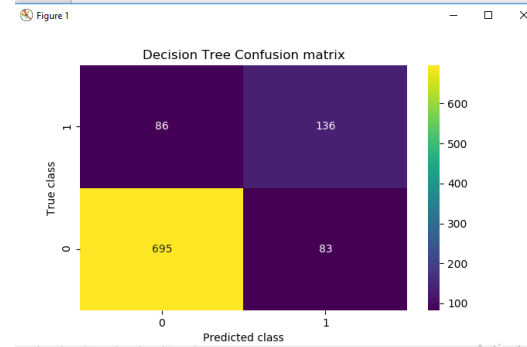
Swapnil Sarkar Gave Rating : 5.0  
Location Name : Beyond Flavours  
Given Reviews : Soumen das and Arun was a great guy. Only because of their behavior and sincerity, And good food of course, I would like to visit this place again.

Dileep Gave Rating : 5.0  
Location Name : Beyond Flavours  
Given Reviews : Food is good,we ordered Kodi drumsticks and basket mutton biryani. All are good. T hanks to Pradeep. He served well. We enjoyed here. Ambience is also very good.

Nagbhavani K Gave Rating : 5.0  
Location Name : Beyond Flavours

**Tourist Recommendation System Based on Decision Tree**

Decision Tree Precision : 75.54446646671227  
Decision Tree Recall : 75.29644039926816  
Decision Tree FMeasure : 75.41886115147362  
Decision Tree Accuracy : 83.1



In above screen in text area we can see ratings and reviews given by each user and now decision tree will not take string data so we need to convert above text data into numeric format by applying TFIDF algorithm and this algorithm will replace each words with its average frequency (or count) and then build a training vector and to build this training vector click on 'Extract Features' button and to get below screen:

In above screen decision tree is trained and we got its accuracy as 83% and we can see confusion matrix with true and false prediction count. Now decision tree is built for recommendation and now enter some input and then click on 'Predict Recommendation' button to get output.

**Tourist Recommendation System Based on Decision Tree**

	aa	aaamstrta	aaehari	aaalo	aaalu	aaam	...	zomatovhy	zombie	zomoto	zomto	zone	zuechi
0	0.0	0.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	0.0	0.0
1	0.0	0.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	0.0	0.0

[4999 rows x 11096 columns]

Total tourist reviews found in dataset : 4999  
Total records used to train decision tree algorithm : 3999  
Total records used to test decision tree algorithm : 1000

**Tourist Recommendation System Based on Decision Tree**

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Decision Tree Recall : 75.29644039926816  
Decision Tree FMeasure : 75.41886115147362  
Decision Tree Accuracy : 83.1

In above screen we can see each words is put on column header and its frequency will be put in remaining rows and if word appear then its average frequency or count will be put in rows otherwise 0 will be put and in above screen we can see all reviews data is replaced with numeric frequency vector and we can see dataset contains total 4999

In above screen in text field I entered input as 'Chinese cuisine' and then click button to get below result



## Tourist Recommendation System Based on Decision Tree

Recommended Restaurant : Beyond Flavours Given Rating 5.0  
 Recommended Restaurant : Paradise Given Rating 5.0  
 Recommended Restaurant : Flechazo Given Rating 4.0  
 Recommended Restaurant : Shah Ghouse Hotel & Restaurant Given Rating 5.0  
 Recommended Restaurant : Over The Moon Brew Company Given Rating 5.0  
 Recommended Restaurant : The Fisherman's Wharf Given Rating 4.0  
 Recommended Restaurant : eat.fit Given Rating 3.0  
 Recommended Restaurant : Hyper Local Given Rating 4.0  
 Recommended Restaurant : Barbeque Nation Given Rating 3.0  
 Recommended Restaurant : Absolute Sizzlers Given Rating 2.0  
 Recommended Restaurant : The Lal Street - Bar Exchange Given Rating 5.0  
 Recommended Restaurant : AB's - Absolute Barbecues Given Rating 4.0  
 Recommended Restaurant : NorFest - The Dhaba Given Rating 5.0  
 Recommended Restaurant : Hotel Zara Hi-Fi Given Rating 1.0  
 Recommended Restaurant : 10 Downing Street Given Rating 3.0  
 Recommended Restaurant : Pakwaan Grand Given Rating 3.0  
 Recommended Restaurant : Jonathan's Kitchen - Holiday Inn Express & Suites Given Rating 4.0  
 Recommended Restaurant : SKYHY Given Rating 1.0  
 Recommended Restaurant : Tiki Shack Given Rating 4.0  
 Recommended Restaurant : Mustang Terrace Lounge Given Rating 4.0  
 Recommended Restaurant : Pot Pourri Given Rating 2.0  
 Recommended Restaurant : Pista House Given Rating 4.0  
 Recommended Restaurant : Marsala Food Company Given Rating 4.0  
 Recommended Restaurant : Mazzo - Marriott Executive Apartments Given Rating 5.0  
 Recommended Restaurant : Green Dawarchi Restaurant Given Rating 1.0  
 Recommended Restaurant : Banana Leaf Multicuisine Restaurant Given Rating 5.0  
 Recommended Restaurant : Kritunga Restaurant Given Rating 1.0  
 Recommended Restaurant : The Glass Onion Given Rating 5.0  
 Recommended Restaurant : Deli 9 Bistro Given Rating 4.0  
 Recommended Restaurant : Frio Bistro Given Rating 4.0

Activate Window  
Go to Settings to act

In above screen we got recommended restaurant from decision tree with ratings and from above list user will choose desired restaurant and now try with other input

## Tourist Recommendation System Based on Decision Tree

Recommended Restaurant : Paradise Given Rating 4.0  
 Recommended Restaurant : Flechazo Given Rating 5.0  
 Recommended Restaurant : Shah Ghouse Hotel & Restaurant Given Rating 5.0  
 Recommended Restaurant : Barbeque Nation Given Rating 5.0  
 Recommended Restaurant : Hotel Zara Hi-Fi Given Rating 1.0  
 Recommended Restaurant : Pakwaan Grand Given Rating 3.0  
 Recommended Restaurant : Pista House Given Rating 4.0  
 Recommended Restaurant : Karachi Cafe Given Rating 3.0

In above screen I entered input as 'haleem' and then got recommended restaurant in text area. Similarly, you enter any input and if given input available in decision tree trained model then we will get recommendation.

## Conclusion:

Many people are busy in their daily routine and when an opportunity to travel comes, one typically chooses to spend more time (and money) to visit well known touristic locations such as the Eiffel Tower or the Big Ben. Sometimes, people forget or ignore the fact that their home country also has great places to visit. Many approaches for tourist guides have been proposed, but all of them are mainly focused in well-known touristic locations. We have developed a service, with Web and mobile interfaces, targeted at the discovery of previously unseentouristicpointsof interest. We

have integrated a collaborative filtering based recommender engine. The recommended information is based on locations previously rated by the user and other users. Users can visualize places in the neighborhood of their current geographic location. Thus, our service helps users to discover new places without any effort from their part. The developed solution has an easy to use interface, for the widely used iOS platforms. The usability and load tests done on the application produced adequate results. This application will contribute to tourism, by promoting all kind of touristic locations, even the lesser known ones in the proximity of the users location. Its social component with the recommender system allows for users to interact between themselves.

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