Intelligent Tour Recommendation System

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Abstract : This paper is about Intelligent Tour Recommendation System. Everybody loves going on vacation but we need a construable amount of time sitting and planning for one. We need to go through every Hotel, Attraction, Restaurant, Rating, Review, Attributes and choosing the right set of things in our budget. The entire process is highly tedious. Planning for a vacation that accommodates all preferences of the travelers without having to look through at least 15 websites and other sources is close to impossible. Our Motivation behind doing this project is to reduce the time span of planning for vacation and help travelers spend more time on vacation that they love. We provide the travel plan based on the details of travel, which we collect from users, like their destination, budget, start and end date for travel. We ask user to select at least five categories of attractions in descending order of priority. We have used Content Based and Collaborative filtering to provide worthy recommendations for the user; i.e. based on their preferences/selection, we provide them some tourist places that would be the best fit for their vacation in all aspects.

IndexTerms **- Tourist, Tour, Recommendation, Collaborative Filtering, Content-based Filtering, Matrix**

I. INTRODUCTION

Nowadays, travel information is increasing to appeal the tourists worldwide. Although there is a lot of information provided on the web, user gets puzzled in finding accurate information. Traditional recommender systems usually rely on user explicit ratings. Travel data are much fewer and sparser than traditional items, such as for movie recommendation, because the costs for travel are much more expensive than for watching a movie. The recommender system deals with a large volume of information present, by filtering the most important information based on the data provided by a user and other factors that take care of the user's preference and interest. It finds out the match between user and item and imputes the similarities between users and items for recommendation. Both the users and the services provided have benefited from these kinds of systems. The quality and decision-making process have also thus improved through these kinds of systems.

II. LITERATURE SURVEY

We have gone through many research papers to get the clear idea about our project (Intelligent Tour Recommendation System) and completed our literature survey. After reading all these papers, we learned about the existing work / systems that are similar to our project. Table 1 illustrates the entire literature survey done for this project.

table 1: literature survey

Paper Work	Year of Publication	Author	Publication	Proposed Work
A Personalized Hybrid Tourism Recommender System	2017	Mohamed Elyes Ben Haj Kbaier, Hela Masri, Saoussen Krichen	IEEE	Personalized recommender system that suggests to a tourist what are the most convenient PoIs in a particular destination, given his profile and his previous appreciations. (Dataset was of Paris)
A Tourist Place Recommendation and Recognition System	2018	Viken Parikh, Dhwanil Dharia, Madhura Keskar, Pradnya Gotmare	IEEE	A mobile application, which will take the user's interest and recommend attractions, restaurants, and hotels. (Dataset was of world)
Traveler's Recommendation System Using Data Mining Techniques.	2018	Prof. Shrikant Kokate, Ashwini Gaikwad, Pranita Patil , Manisha Gutte, Kalyani Shinde	IEEE	Recommendation is done on the basis of tourist needs, interest i.e. users location, distance range, type of places user is interested. (Dataset was of Pune, Maharashtra)
Tourism Recommendation System Based on User Reviews	2019	Omamah Alnogaithan, Sumaiah Algazlan, Aljoharah Aljuraiban, Amal A. Shargabi	IEEE	A tourism recommendation system based on user reviews. (Dataset was of Europe)

Tourist Recommender System using Hybrid Filtering	2019	Maddala Lakshmi Bai, Rajendra Pamula, Praphul Kumar Jain	IEEE	In this paper a hybrid filtering is proposed to address the cold-start problem. (Dataset was of Thailand)

III. METHODOLOGY

This paper proposes a hybrid recommender system, which combines some of the most known recommender methods like Collaborative Filtering (CF) and Content-based Filtering (CB). In order to implement these recommender methods, we have applied Machine Learning algorithms, such as the K-nearest neighbors (K-NN) for both CB and CF.

Collaborative Filtering

Collaborative Filtering is used in recommendation systems. There are two types of Collaborative Filtering, Item based and Content-based Collaborative Filtering. In general sense, Collaborative Filtering is the process of filtering for information or patterns using techniques involving collaboration among multiple agents, viewpoints, data sources, etc. There are various reasons for using Collaborative Filtering, one of which is, it is applicable for large datasets. As compared to Content-based filtering, the accuracy of Collaborative Filtering is much more.

Content-Based System

In contrast to collaborative filtering, Content-based approaches uses additional information about the user and / or items to make predictions. It is used to filter the results based on content similarity by using Cosine similarity.

Cosine similarity (CS) is the measure of similarity between two vectors, by computing the cosine of the angle between two vectors projected into multidimensional space. It can be applied to items available on a dataset to compute similarity with one another via keywords or other metrics. Similarity between two vectors (A and B) is calculated by taking the dot product of the two vectors and dividing it by the magnitude value as shown in the equation below. We can simply say that the CS score of two vectors increases as the angle between them decreases.

$$cos(\theta) = \frac{A.B}{||A||.||B||} = \frac{(\sum_{i=1}^{n} Ai.Bi)}{\sqrt[2]{\sum_{i=1}^{n}(Ai)^2}\ \sqrt[2]{\sum_{i=1}^{n}(Bi)\text{^}2}}$$

K- Nearest Neighbors Algorithm

The K-Nearest Neighbors (KNN) algorithm is a simple, easy-to-implement supervised Machine Learning algorithm that can be used to solve both classification and regression problems. The KNN algorithm assumes that similar things exist in close proximity. In other words, similar things are nearer to each other.

Dataset

We have used two different datasets for extracting the information of location and various hotels presents at the same. We have used YELP dataset for restaurants and TRIPADVISOR datasets for hotels. To extract the data from datasets, we used web crawler for extracting large amounts of data from websites whereby the data is extracted and saved to a local file. And scrappy python framework to efficiently extract data from websites.

IV. DESIGN DETAILS

Once the user registered and logged in to our system/website, they shall be getting a form where they have to enter the basic details like start date, end date, destination, etc. to get the preferred output/recommendation. After getting all the details from user through User Interface of ITRS, our Application will segregate those details according to preferences and classify them based on content and user similarities by using Content Based (CB), Collaborative Filtering (CF) or combination of both i.e. Hybrid Filtering. The result will be displayed to the user after classification through ITRS Application.

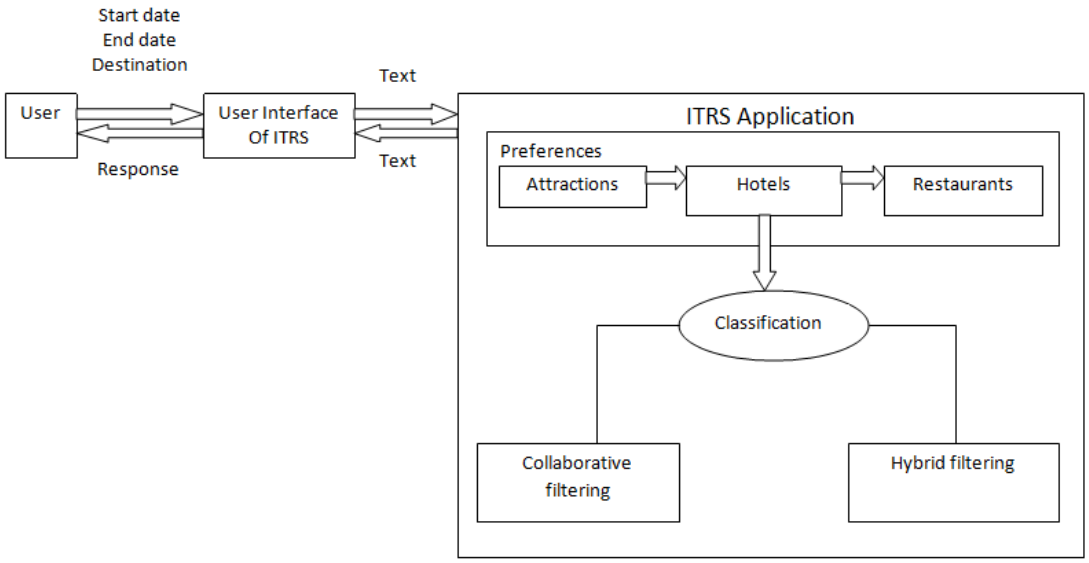


figure 1: system architecture

Data Model and Description

Data models describes the relationship and association among data that includes Entity Relationship Diagram (ERD). ERD is a diagram that displays the relationship of entity sets stored in a database. Here, the entities are - User, Preferences, ITRS Application and Personalized results.

The following diagram shows various attributes of these entities and also shows the relationship among these different entities. The attributes present in User are – User_id, UName, Password and Contact. The attributes of ITRS Application will be same as the attributes of User. The attributes present in Preferences are – Start_date, End_date, Destination, Attractions and Food.

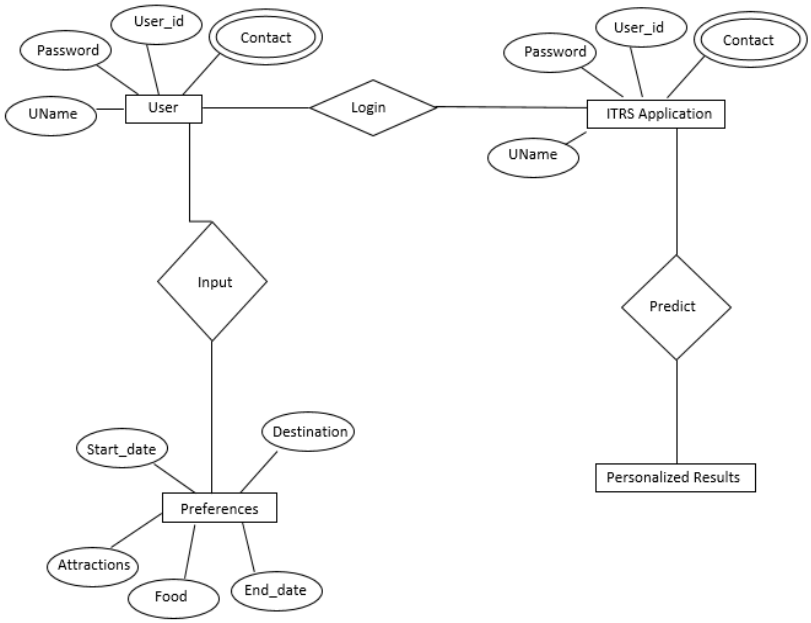


figure 2: entity relationship diagram

Dataflow Model:

Data Flow Diagram (DFD) shows graphical representation of the "flow" of data through an information system, modelling its process aspects. It includes data inputs and outputs, data stores, and the various sub processes through which the data moves. DFDs are built using standardized symbols and notations to describe various entities and their relationships.

The system for simplification is divided by three entities i.e. User, ITRS application and Admin, which make up the level 0 DFD. There is two-way communication between the User and ITRS application. The level 1 DFD shows how the system is divided into sub-systems (sub processes), each of which deals with one or more of the data flows, to or from an external agent, and which together provide all of the functionality of the system as a whole. In level 2 DFD, the level 1 DFD's components are broken down into sub parts where login process is divided into forget password and reset password. Preferences is further divided into start date, end date and destination that is linked to customized results.

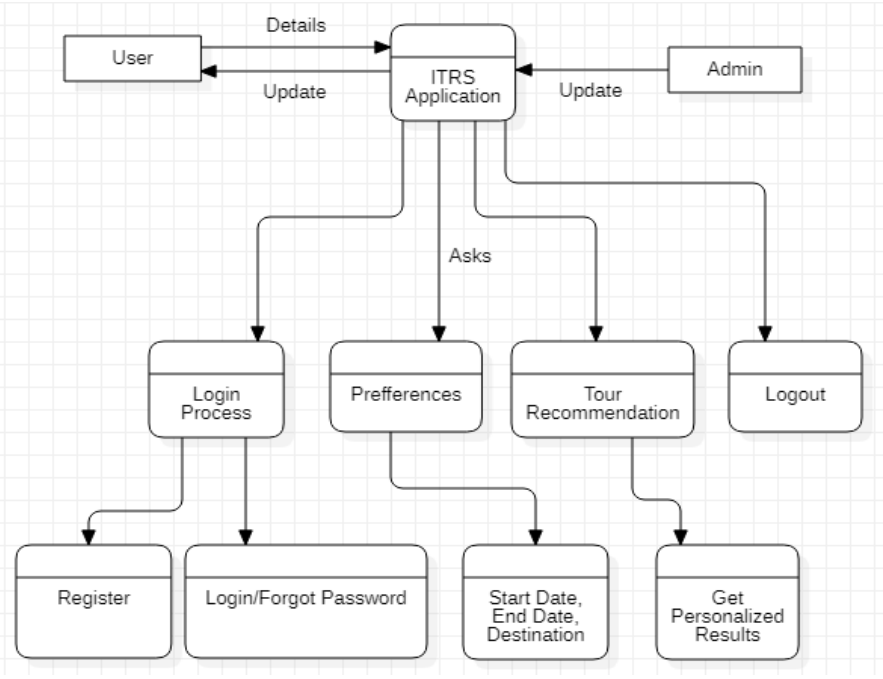


figure3: dfd level (0-2)

Use Case Diagram

Figure 4 denotes the Use Case Diagram of our proposed system. It shows the User's interaction with the systems. The purpose of a use case diagram in Unified Modeling Language (UML) is to demonstrate the various ways that a user might interact with a system. In this use case diagram there are three actors involved, the first actor is User, the second actor is Admin and the third actor is ITRS Application. It depicts the interactions between the various actors used in this system. All these interactions between actors and system are implemented in Python with secured environment. The various use-cases involved in this system, are associated through User, Messaging Channel and ITRS Application respectively.

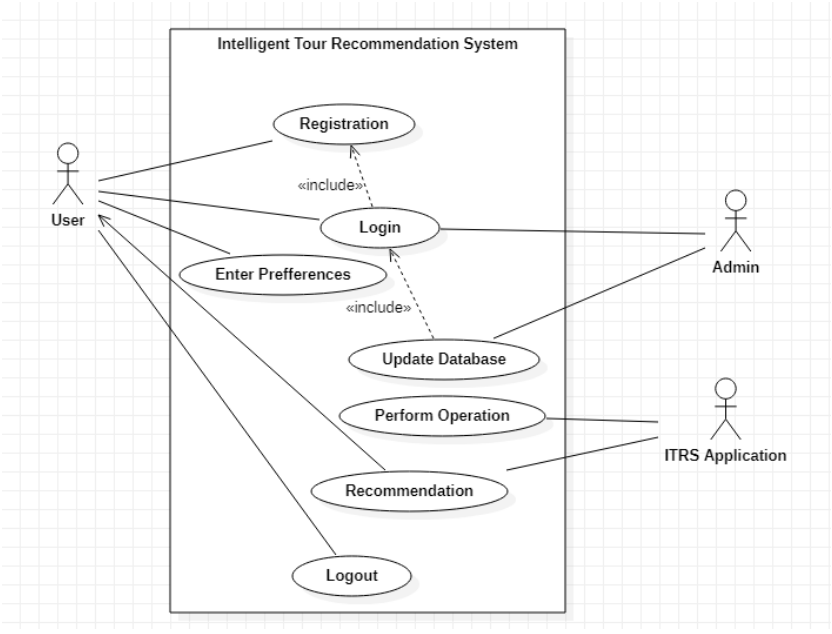
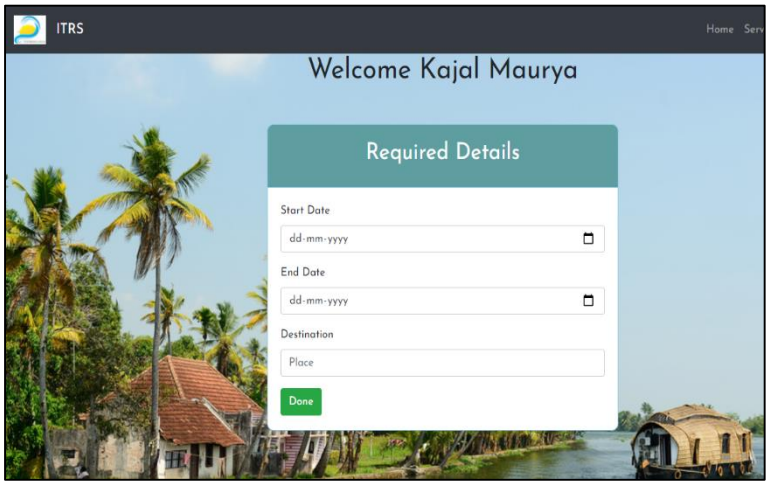


figure4: uml diagram

V. RESULTS AND DISCUSSION

These are the some snapshot of our User Interface. Figure 5 shows the homepage that contains basic information of our website i.e. introduction, services, gallery, contact, etc. As soon as user registers and logged into website it asked for attributes / preference as shown in figure 6. After getting all the inputs from the user, we have shown the recommended places for them as shown in figure 7.

figure5: snapshot 1



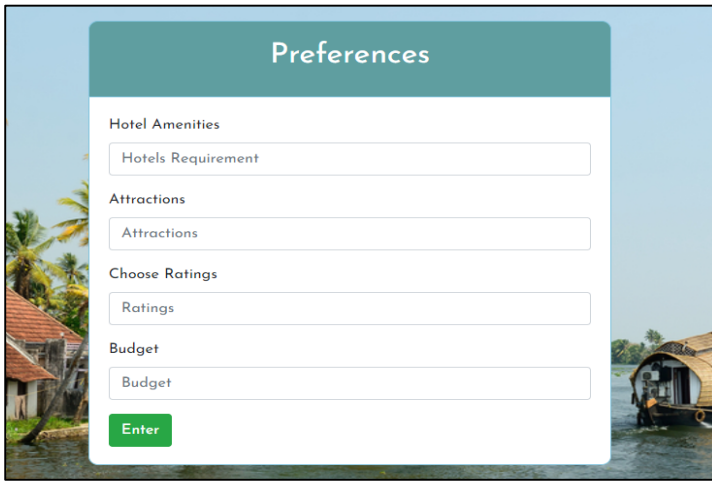


figure5: snapshot 2

Result of analysis

```
C:\Python38-32\python.exe "C:/Users/Dell Latitude E6330/PycharmProject
      category distance   duration  ... p_rating count itemId
0     Wildlife     6 Kms  1-2 Hours  ...      2.2   158      1
1     Heritage     6 Kms  1-2 Hours  ...      4.6   652      2
2     Heritage    13 Kms  2-3 Hours  ...      5.0   783      3
3   Pilgrimage     6 Kms  1-2 Hours  ...      4.9   482      4
4     Heritage     6 Kms     30 Mins  ...      4.2   890      5

[5 rows x 9 columns]
Select your preferred category:
1.wildlife
2.heritage
3.pilgirmage
4.park
5.museum
Enter User Interests: Park
Enter your location:
```

figure 6: analysis

```
Enter userid: 4
The recommended places for you are:
['Nahargarh Fort', 'Birla Mandir', 'Hawa Mahal', 'City Palace / Sawai Man Singh II Museum']
```

figure 7: recommendation

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