Voyageur

A Smart Trip Planner

Akshen Kadakia[1], Urvi Mistry[2], Devanshi Desai[3], Mitchell D'silva[4]
Department of Information Technology
Dwarkadas J. Sanghvi College of Engineering
Mumbai, India
[1]akshenk8@gmail.com, [2]urvi15mistry@gmail.com, [3]devanshihd20@gmail.com, [4]mitchell.dsilva@djsce.ac.in

***Abstract*— In today's busy world, travelling can be one of the therapies that can reduce all our stress. A traveller has lots of dreams but lack of plans. If the user is sure about the place to visit, yet he never finds all the required information at the same place. Even if he finds all the information of the destination; he is not sure about the reviews of the places in that destination and it would take him a number of days to make an itinerary. There are many existing systems such as tour planning websites, offline customized tour planners, etc. to help plan an itinerary, but they don't suffice all the user requirements. Also, they do not provide instant customization. Our survey confirmed that the users experienced some problems with the existing systems. Thus, this paper presents a trip planning application 'Voyageur' which will help the users to plan their trips more efficiently. It will help the users to find all the information required at a single place. Also, it will give freedom to the user to build their customized itinerary automatically by taking into consideration various factors such as user preferences, the distance between places to visit, etc. It will provide the user with alternative plans for their trip using genetic algorithm. It will also suggest best hotels and places to visit based on ratings available on the internet. Thus, this instant itinerary generation will save a lot of user's time.**

Keywords*— *alternative plans, customized itinerary, genetic algorithm, travel, trip, user preferences.

I. INTRODUCTION

People face a lot of problems while planning a trip. Some of those problems identified are: Firstly, there is abundant of information but it is not fragmented properly. Secondly, it is difficult to organize the gathered information for making a decision. Lastly, differentiating the outcomes based on calculation and experience i.e. calculation may suggest that it will take some predefined number of days to visit a place, whereas experience may suggest some more days including other factors such as days for rest, shopping, delays, etc.

For better understanding, the user requirements and the flaws were studied by reviewing the existing systems. For this, an itinerary of the same destination was made on two most popular travel planning websites which are MakeMyTrip [1] and Yatra [2] and its drawbacks were noted down. Also, offline customized tour planners were reviewed. For that, an interview was conducted with a local tour planner to get a gist of their working and the difficulties faced by them during planning of a trip. Then, a survey was conducted to identify the problems faced by people during trip planning and the factors they considered while making the itinerary. In all, 133 responses were collected.

'Voyageur' is a web application which can solve all these problems thus giving users a single common platform on which they will find all their requirements and make an optimized and efficient itinerary based on the ratings that are available on the internet.

To fill the loopholes in the existing system, the proposed system provides features such as: the application will help the users to plan their trips more efficiently than the existing systems. The user will be able to find all the information required at a single place. Voyageur offers automatic itinerary generation which takes into consideration various factors such as user preferences, the distance between places to visit, etc. The generated itinerary will contain the best sightseeing to visit based on user preferences and the ratings available on the internet. It will also suggest best hotels which are nearest to all the preferred places to visit. The users can replace or swap the sightseeing in the generated itinerary as per their interest. The users can define block time and location, so that they can consider food breaks, conferences, shopping time, rest time, events, etc.

II. RELATED WORK AND USER EXPECTATIONS

There are many sources through which a user can plan a trip. Some of those include online websites such as MakeMyTrip [1], Yatra [2], etc. In these websites, option for customization of plan is not available. If the users wish to make any changes to the pre-defined plan, they need to contact the customer support. They prepare an itinerary for users in a day or two manually. The problem that occurs with these websites is that the number of users using this site is much more than the number of people hired under customer support. If each of the customers wants to customize their own trip, the response or the customized itinerary will suffer a delay of a day or two and it will also lead to a huge load on the customer support employees.

An interview was conducted with an offline customized tour planner to understand their working and problems faced by them. They responded that whenever a customer wants to plan a trip, the planner in their office takes a note of customer details and requirements like places of interests and their budget. Then the planner finds the packages that are suitable and suggests it to the customer. This communication is either face-to-face or a phone or a mail communication. This process is continued until the customer is satisfied with the holiday destination suggested to him. The planner then communicates with the Destination based markets also called as DMC's to

find all the good sightseeing and restaurants available in that destination. Then reviews and ratings of the places suggested by the DMC are reviewed. This data is used to make an efficient itinerary considering the breaks, the distance between the sightseeing, the average time spent on each spot, etc. This is done manually and hence it takes 4-5 days. The itinerary is shown to the customer for making changes if any and then the process is repeated again which further takes 1-2 days. Therefore this process requires a long time to make a personalized itinerary.

The Smart Travel Planner [3] is an application that uses user fed profiles to suggest places that the user should visit. The user has to manually enter the time when he wants to visit the place and duration he wants to spend at that place. Some of the drawbacks of this system include that it does not provide an itinerary but only suggests the places and it is not user-friendly as automation is very less.

Another prototype is ATIPS (Automatic Travel Itinerary Planning System for Domestic areas) [4]. It computes the score for each tourist spot based on five factors namely: user preferences, popularity, time, distance and cost. Simply by entering the travel time, departure point, and the location of the destination, the system generates a travel itinerary. Based on the above information entered by the user, feedback from user's previous tours planned using the system and user's traveling habits; a travel itinerary matching user's preferences is automatically generated.

To understand the problems faced by the general masses, a survey was conducted. 133 responses were received which shed light on some problems which need to be improved in the existing systems. According to the survey, about 56.4% people used some external means for planning the trip and 84.2% people referred reviews posted by people on various platforms before finalizing the itinerary. 60.9% people felt that the current processes available for making the itinerary were time-consuming. 'Voyageur' aims to make this process less time consuming with instant and efficient results. Also, it was noticed that more than half of the people surveyed, found it difficult to find all the requirements at one place. 84.9% people agreed that in case of any changes, updated itinerary was not available instantly. 91% people wanted to automate the existing system which would be more convenient and provide instant results.

III. Problem Definition

The problems identified were that the users had to make a comparative study of all the places they want to visit before deciding their holiday destination. They had to search for the places on many websites, make a list of sightseeing, calculate the total cost incurred, ask their friends and relatives about their experience and go through the reviews about that place available on the internet. After gathering all this information, the users need to finalize the destination, decide on the mode of travel and the sightseeing based on user preferences. And lastly, the users had to create an itinerary considering various parameters like food breaks, shopping, rest breaks, etc. This is a tedious and a time-consuming job. In this busy world, nobody has time to plan all this and then go for the trip. Even if they do all this, they are sometimes not satisfied with the trip they planned or they don't have time to visit all the places or miss out some good places in that holiday destination. Proper planning plays a very important role. 'Voyageur' tries to eliminate these problems and smoothen the entire process.

IV. Proposed Architecture with Modular Description

A. External data gathering and cleaning module

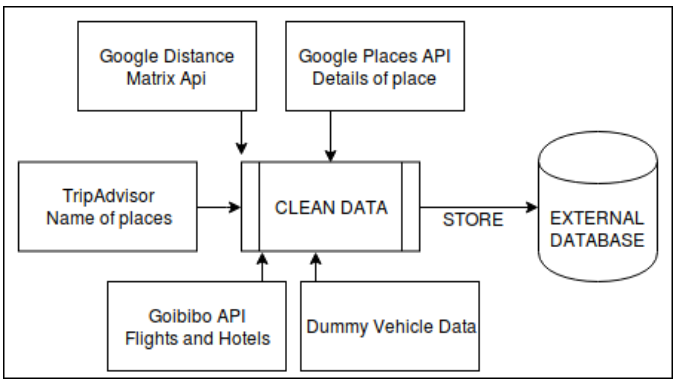

Fig. 1. External data gathering and cleaning module

The data is fetched from various sources such as:

- TripAdvisor [5]: It provides name, rating and tags of the various sightseeing.
- Google places API [6]: It is used to fetch details of the places such as location, website, contact, ratings, opening hours, etc. from the name fetched from TripAdvisor.
- Google distance matrix API [7]: It is used to fetch distances between places.
- Goibibo API [8]: It is used to fetch hotel data such as name of hotel, facilities, policies, ratings, types of rooms, maximum number of people in each room, etc. It is also used to fetch data of flights like arrival time, departure time, number of stops, rate and name of the airlines for specified source to destination on a particular date.
- Dummy vehicle data: It is the temporary database created to get an estimate price of cars/cabs/buses to visit all local sightseeing.

Data fetched from the above mentioned sources is cleaned as per requirement. The cleaned data is stored in an external database for caching the results.

B. Input Module

The input is taken from the user which includes source, destination, start and end date of travel, preference profile, mode of travel and freeze times.

The user can make multiple preference profiles. These profiles will be stored so that the user can use it again.

The preference profile specifies day start and end time and user preferences like Nature, Adventure, Religious places,

Historical Places etc. for which user provides ratings between 0 (do not include) to 5 (include more). User preferences act as a filter for considering the places to be included in the itinerary.

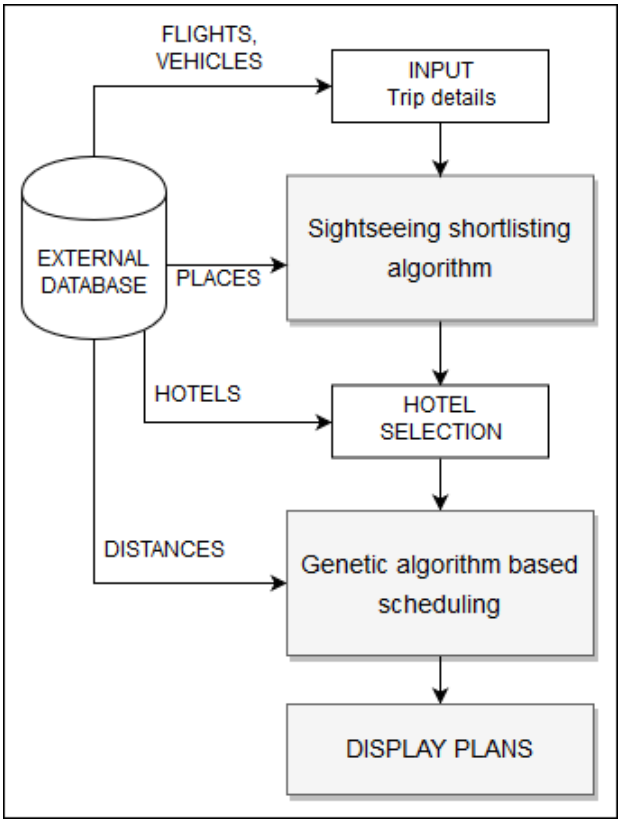

Fig. 2. System architecture

C. *Sightseeing shortlisting algorithm*

The input data is used to shortlist the sightseeing and generate hotel recommendation circle. Figure 3 describes the algorithm in detail.

The algorithm takes care that a proper mix of the sightseeing is included depending on user preferences and the total number of days of the trip.

D. *Hotel selection module*

A 5km recommended circle is shown around the center point calculated in sightseeing shortlisting algorithm. The user can select any hotel preferably in the recommended circle which will help him save time.

E. *Genetic algorithm based scheduling*

Genetic algorithm is used to schedule shortlisted sightseeing to generate an itinerary by taking care of user constraints. Genetic algorithm is used so that the user can be provided with alternative plans. Time spent at each sightseeing is considered to be 2hours due to unavailability of data. Lunch time is added to a sightseeing being visited between 1PM-2PM while generating the itinerary. Time taken for lunch is calculated based on number of members travelling which varies between 45mins to 2hours.

Genetic algorithm is used with tournament selection technique for choosing parents and uniform crossover technique to generate children from the chosen parents. The crossover probability is set to 0.8 and mutation probability is set to 0.2.

Algorithm shortlisting _sightseeing(*input_data***):**

1. Initialize *places* with all sightseeing for the selected destination.
2. Set *user_tag_values* as the rating of each preference given by the user in *input_data*.
3. Initialize *tagwise_place_list* as an array of list.
4. For each *place* in *places*:
   - For each *tag* in *place*[*tags*]:
     - Add *place* to *tagwise_place_list*[*tag*].
5. For *tag* in *tagwise_place_list*:
   - Sort *tagwise_place_list*[*tag*] in descending order based on rating of each *place* in the list.
6. Initialize *sum_tags* = 0.
7. Initialize *alpha* = 0.04.
8. Initialize *tag_data* as an array.
9. For each *tag* in *user_tag_values*:
   - *tag_data*[tag] = tuple(*tag_rating* = *user_tag_values*[*tag*], *visited_count* = 0)
   - sum_tags = *sum_tags* + *user_tag_values*[*tag*]
10. Set *decrementer* = (*alpha* * sum_tags)/(number of trip days * *places_per_day*)
11. Create an empty list *shortlisted_sightseeing*.
12. While *tag_data* is not empty:
    - Sort *tag_data* in descending order based on *tag_rating* value.
    - Remove *split_places*[*tag_data*[0]] and add it to *shortlisted_sightseeing*.
    - *tag_data*[0][*visited_count*] = *tag_data*[0][*visited_count*] + 1.
    - *tag_data*[0][*tag_rating*] = *tag_data*[0][*tag_rating*] - (*decrementer* * *tag_data*[0][*visited_count*]).
    - If *tag_data*[0][*tag_rating*] <=0 or length(*split_places*[*tag_data*[0]]) == 0:
      - Remove *tag_data*[0].
13. Calculate center point of all *shortlisted_sightseeing*.

Fig. 3. Algorithm for shortlisting sightseeing

F. *Display plans*

The comparison of alternatives is displayed to the user. The user can view detailed itinerary of each alternative. It will also allow the user to see details, ratings and pictures of a place/hotel in the itinerary. It gives freedom to swap between the places in the same itinerary or replace the places with the tourist places which fall under the selected user preferences. He can edit the itinerary for instant customizations. The itinerary can be shared with anyone the user wants. The user can even save the itinerary for future access. On each day, best rated restaurants will be displayed for lunch by using Zomato API [10].

V. FEATURES

1. Itinerary can be generated within few minutes if the data of destination is cached on server side.
2. The user preferences are saved as profiles for later use.
3. Place suggestions are based on preferences given by the user.
4. User can specify the day start time and day end time.
5. It allows the user to block time slots on particular days at specified location for shopping, food breaks, conferences, events, etc.
6. The application generates a number of alternative plans using genetic algorithm from which user can choose the best plan that suits all the requirements.
7. The application allows the owner of the itinerary to save and share the plan with friends or colleagues.
8. While selecting hotels, the user is provided with a recommended circle. If the user chooses a hotel from this circle he can save time.
9. It suggests the restaurants near the tourist places to have lunch.
10. It gives freedom to the users to swap the places in the generated itinerary or replace it with the other place which fall under the selected user preferences.

VI. RESULTS

A prototype of Voyageur was demonstrated to 20 users individually and a feedback was taken from them. The users were asked if they would like to add the features of Voyageur in the existing systems. 85% people felt it necessary to integrate its functionality in the current system. Then they were asked which features are unique in Voyageur. The responses collected were its accuracy of suggesting best sightseeing, rescheduling capability, consideration of user preferences, generation of alternative plans and user satisfaction due to available customization option. The users were also asked about the features that Voyageur must include in near future. The users suggested working on the user interface, providing an option to export the itinerary, including more images for sightseeing and considering morning treks and night life. They also suggested integrating a chat portal for all the members who have access to the itinerary and a feedback portal for the generated itinerary. Overall 80% of the people rated the performance of Voyageur as 4 and above out of 5.

The prototype of Voyageur was used to generate an itinerary for a 9 day trip to Goa, India. Figure 4 and figure 5 depict the overview of two alternatives which provides the cost breakup. Figure 6 depicts day 1 of the alternative 1 which shows the mode of travel selected by the user and time taken to travel between places. Figure 7 depicts the schedule for day 2 for visiting the sightseeing. It also adds duration for lunch between 1pm to 2pm. The user is also provided buttons to replace or swap sightseeing and to view the information. Figure 8 depicts the freeze time added by the user at a specific location or hotel.

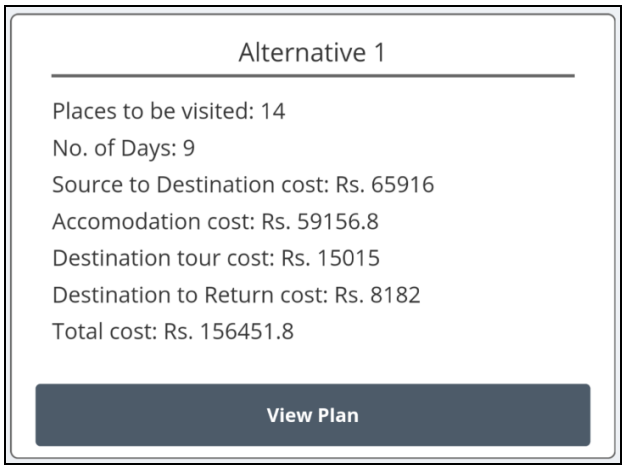

Fig. 4. Alternative 1 overview.

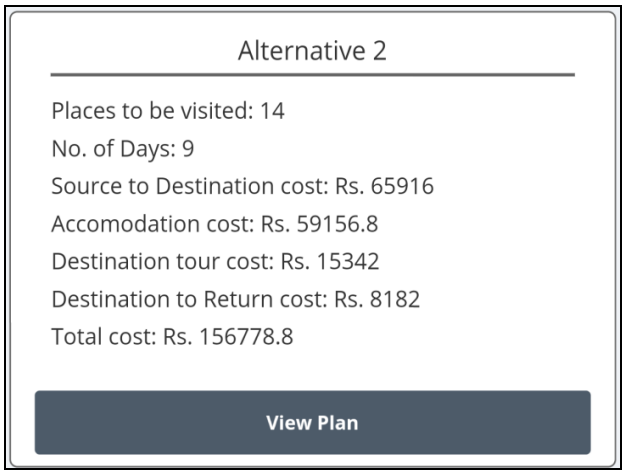

Fig. 5. Alternative 2 overview.

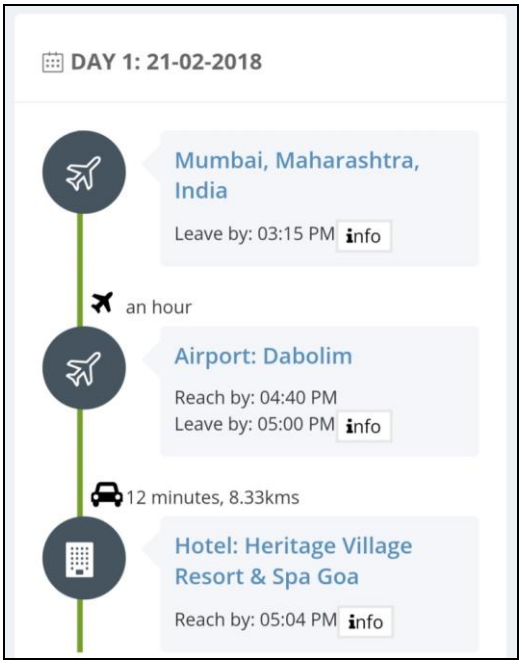

Fig. 6. Day 1 of aleternative 1.

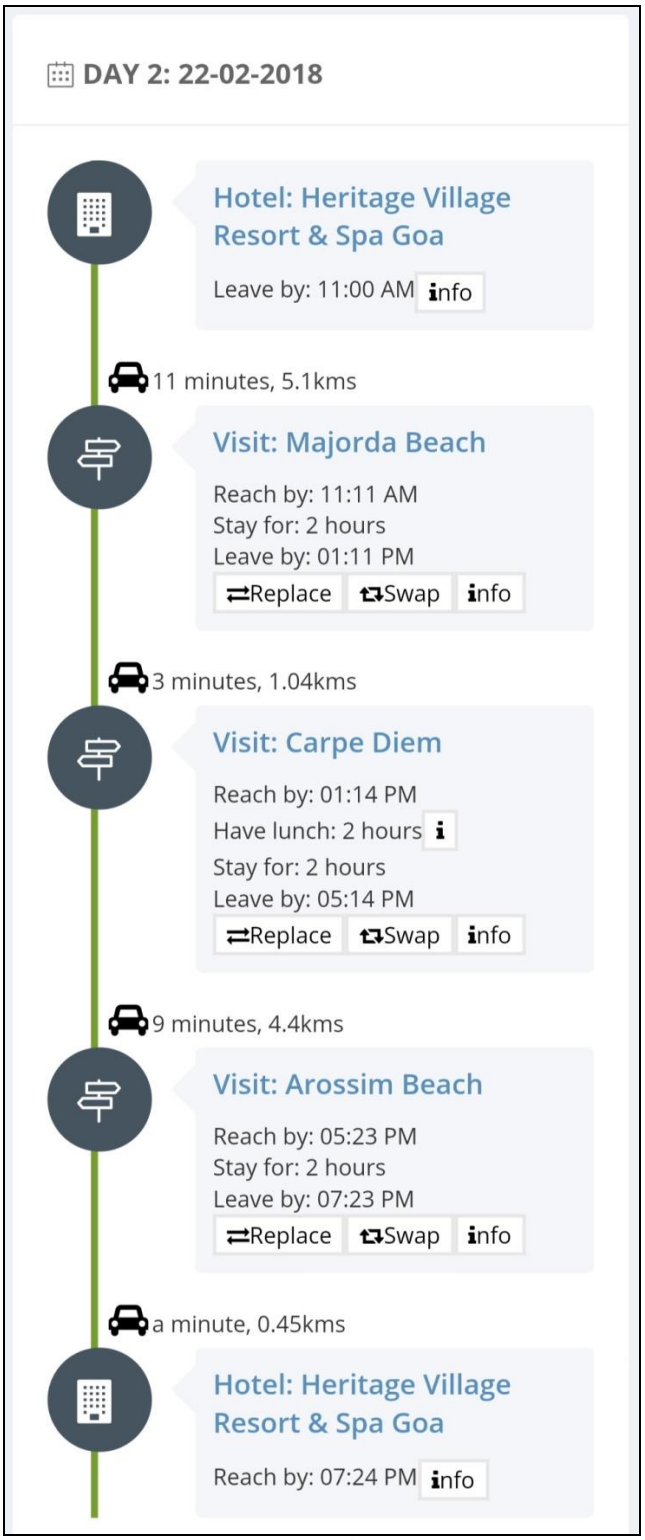

Fig. 7. Day 2 of alternative 1.

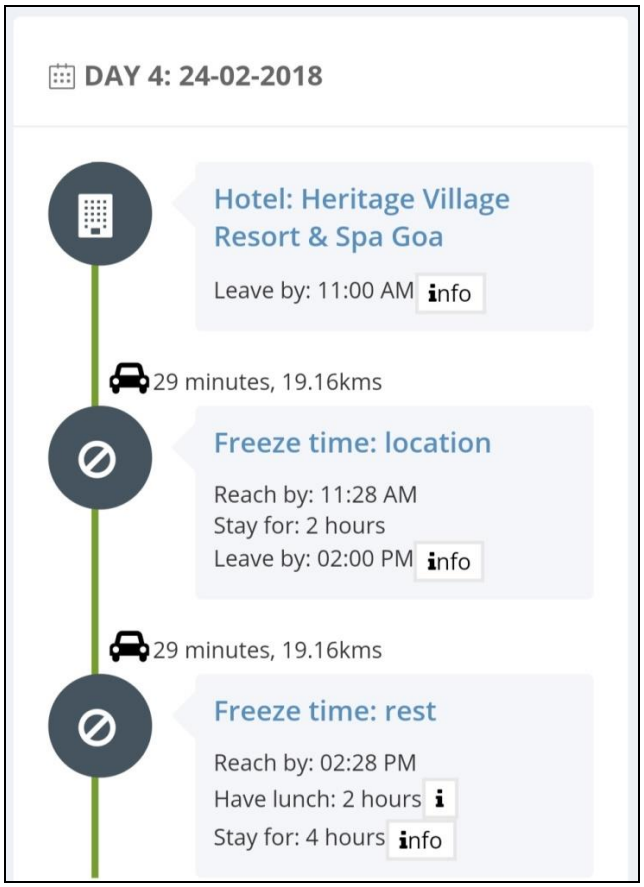

Fig. 8. Day 4 of alternative 1.

VII. CONCLUSION

'Voyageur' can be used by a user who wants to plan his trip in minimal time and also provides him an interface to explore the available options to make his own personalized itinerary. It can also be used by an offline customized tour planner to reduce the tedious work done by him to plan the trips for his customers in lesser time. Thus, this application plans to improve and automate the existing system.

In future, Voyageur can be built as a mobile application which will be pocket-friendly for the users. It can also be planned to collect requirements of the users using Artificial Intelligence Bot so that even a layman can use this application. In future, the itinerary can be rescheduled while travelling by the user to accommodate the unexpected travel delays. Also, Natural Language Processing (NLP) can be implemented on the reviews and various travel blogs to get more information about the sightseeing so that best sightseeing are suggested to the users. NLP can also be used to automatically classify places using their tags. As Voyageur is just a prototype considering only Kolkata, Mumbai, Delhi and Bangalore as the sources and Goa, Jaipur and Udaipur as the destination, in future it can be implemented for all places worldwide.

REFERENCES

[1] "MakeMyTrip - #1 Travel Website 50% OFF on Hotels, Flights & Holiday". [Online]. Available: http://www.makemytrip.com. [Accessed: 30- Aug- 2017].

[2] “Flight, Cheap Air Tickets , Hotels, Holiday, Trains Package Booking - Yatra.com”. [Online]. Available: http://www.yatra.com. [Accessed: 30- Aug- 2017].

[3] R. Jafri, "Smart Travel Planner: A mashup of travel-related web services", Current Trends in Information Technology (CTIT), pp. 181-185, 2013. [Accessed: 15- Aug- 2017]

[4] Hsien-Tsung Chang, Yi-Ming Chang, and Meng-Tze Tsai, “ATIPS: Automatic Travel Itinerary Planning System for Domestic Areas,” Computational Intelligence and Neuroscience, vol. 2016, Article ID 1281379, 13 pages, 2016. doi:10.1155/2016/1281379. [Accessed: 15- Aug- 2017]

[5] “TripAdvisor: Read Reviews, Compare Prices & Book”. [Online]. Available: http://www.tripadvisor.com. [Accessed: 15- Oct- 2017]

[6] “Google Places API | Google Developers”. [Online]. Available: http://www.developers.google.com/places/. [Accessed: 26- Dec- 2017]

[7] “Google Maps Distance Matrix API | Google Developers”. [Online]. Available:http://www.developers.google.com/maps/documentation/distance-matrix/. [Accessed: 10- Mar- 2018]

[8] “Goibibo”. [Online]. Available: http://www.developer.goibibo.com/. [Accessed: 10- Mar- 2018]

[9] S.N. Sivanandam, and S.N. Deepa. “Genetic Algorithm,” in Principles of Soft Computing, 1st ed., India, New Delhi:Wiley India Ltd., 2010. pp. 475-534.

[10] “Zomato Developers”. [Online]. Available: http://www.developers.zomato.com/. [Accessed: 10- Mar- 2018]

[11] C. Abilash Reddy, and V. Subramaniyaswamy, “An Enhanced Travel Package Recommendation System based on Location Dependent Social Data,” Indian Journal of Science and Technology, 2015 Jul; 8(16), pp. 1-7. doi: 10.17485/ijst/2015/v8i16/63571 [Accessed: 15- Aug- 2017]