FanOnTour: A Novel Approach to Travel Advisor Systems

Amir Maddah and Manolya Kavakli

***Abstract*—Current Travel advisor applications provide limited common features. There is a need to focus on new support functions for user satisfaction. Such systems must be designed to support surplus learning and users' preferences and constraints. Different choices created in systems' design can induce distinct decision strategies and influence the user's affective state. The goal of this project is to develop a travel advisor system to assist users in their travel arrangements and decision-making. In this paper, we present a novel approach to take into account various factors to provide travel suggestions. These factors are user's point of interest (POI), dislike list, distance, budget, transportation mode, the history of users and list of users' friends. We demonstrate the validity of this approach using a case study and usability testing results.**

***Index Terms*—Travel advisor application, recommender system.**

I. Introduction

Internet is a large bank of information used by increasing number of people worldwide with different intentions. A common purpose is to find available options for their needs. A recent survey of Hotwire [1] shows that young Australians "do not mind spending money on overseas adventures but are adamant about receiving the service and experiences they pay for." The survey shows that "25 to 32-year olds' biggest concern is not getting value for money. After handing over their cash, a quarter of Australians admit that they still worry they have not booked the best holiday or hotel deal available". Trip Advisor systems are a subgroup of recommendation systems. These systems help users to arrange their travels based on their interests and constraints. Currently, Trip Advisor websites provide a limited number of common features. For instance, some of them just provide information about a particular place, or provide hotel-booking services only. Therefore, users need to visit many websites to find the required information. They also need to match the collected information with their itineraries. After reviewing recommender systems, Trip Advisor websites and their weaknesses, we propose a solution that takes into account various factors to provide travel suggestions, such as user's Point of Interest (POI), dislike list, budget, distance, transportation mode, users' history and list of users' friends. Validity of this approach is demonstrated using a case study as well as the results of our usability testing.

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II. Literature Review

Decision-making process requires a large amount of time and effort. Choosing the best option is a tricky task, particularly when there are a large number of available options and we are dealing with a lot of constraints. Many people experience this "many-answers-problem" while looking for something on the Internet, as they encounter a large amount of information that is provided by different sources. In this case, these options need to be thoroughly investigated and filtered out to find the best solution [2]-[3]. In Travel recommendation systems, people have specific needs and interests to satisfy. Some may want to stay in a specific hotel or attend a specific event or a business meeting. This is not taken into account while using a generic search engine or existing travel advisor websites.

Let's study an example as a case study. Alex has just decided to visit Sydney in the next 3 days and booked his return flight. He is vegetarian and interested in different cultures and arts. He is also highly interested in staying in a hotel that one of his friends has recommended. However, his friend's interests are different from his. Once he looks for the information about those places, he finds out that there are a few museums in Sydney and two of them are near the hotel. He also finds a large number of vegetarian restaurants around the hotel but he is not sure which ones are the best. He has limited time to search (as he has already booked his flight), Visiting more trip advisor websites makes him confused and overwhelmed with the information, as these websites provide predefined packages and general suggestions. Although there are many websites providing travel advice, there is not a single website that provides an accurate, personalized and customized suggestion to assist users in their decision-making.

There are a number of travel advisors available for Alex to choose from. However, none of these cater for his needs completely. For example, Agoda [4] is a travel related website that is limited to hotel reservation service. Therefore once its users book their hotel, they need to use other websites to arrange their travel activities. In addition, it would be difficult for its users to choose the hotel that is close to all the activities they prefer. In this case, they should use a map application such as Google Map to compare the distance between the suggested hotels and their activities.

TripAdvisor [5] is the world's largest travel site that allows travelers to plan their trips. It provides many features but is limited to the ratings of users and does not provide proper recommendations based on users' needs or interests. Even to check the price of a room in a hotel, users must open many browser windows to compare the price on various websites. Therefore, it is confusing for the users and difficult to find the lowest price.

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Henly [6] states that, the best eight travel websites are Adioso, Travellr, AirBnb, Goby, Gogobot, Hipmunk, Travellerspoint and Wanderfly. Although they provide useful services, none of them provides personal and customized suggestions. Most of their features are in common and these features are not sufficient to address users' needs. Among these, Adiosa [7] and Hipmonk [8] are exceptions. These websites are limited to hotel booking, but they provide some extraordinary features, such as a powerful search box.

Travellr [9] is a question and answer website for travelers. Users may ask questions and receive the answers by locals. If a user asks for all the attractions in a specific city, the replies will be based on the respondents' interests, not on the user's interests. Therefore, users are expected to trust the respondents.

Airbnb [10] is also limited to accommodation services. Goby [11] provides both i-Phone and web applications that are limited to providing suggestions on activities. Its major weakness is being location specific (limited to the cities of the United States).

Gogobot [12] is known as the Facebook for travelers. It allows users to post their questions on Facebook or Twitter to be answered by their friends.

Travellerspoint [13] does not provide a comprehensive suggestion based on user's interests.

Wanderfly [14] allows users to enter their interests to receive the recommendations using an elegant interface, but it does not always provide accurate suggestions. Its reviews and ratings are based on its own users and some places to visit has no or limited ratings.

NYCGO [15] is the 2012 winner of tourism section of Webby. Although it has an appealing interface, the aim of the website is to provide a comprehensive information about New York City only, and therefore, it is location specific. It provides comprehensive information about the city but it does not offer any personalized suggestions.

Many algorithms have been proposed to solve the issues discussed above. Each has its own weaknesses and strengths but none of them provides a customized solution and users face difficulties in their travel arrangements. For example, Hyoseok and Woontack [16] used GPS data to provide recommendations for a social itinerary recommendation system. The system divides its tasks into offline and online modes. In offline processing mode, using location and interests, it builds a Location-Interest Graph. In online processing mode, it uses the built graph to make recommendations. The major weakness of this system is that it does not provide many features to users. It is crucial for the system to collect a verified, comprehensive dataset as it is based on user-generated GPS data. Moreover, users should always carry their cell-phones and pay for the internet usage, which may cause dissatisfaction as most travelers try to minimize unnecessary costs.

In [17] a web-based recommendation system is proposed using a Wireless Sensor Network (WSN). The proposed method requires installing the WSNs in the touristic sites to locate users so that it can provide facilities to upload their rating about a particular location. Although a cost effective wireless sensor network has been built, their solution still has many limitations and is costly. Touristic sites might be reluctant to purchase and install the system. It also requires the users to carry their cell phones to be able to rate the location, while they are in the premises. Therefore, they should pay for the Internet usage and if they leave the location, they cannot rate it anymore.

III. Proposed Solution

Our design focus is the completeness and accuracy of the features that are not supported by current solutions in travel advisor systems. The comprehensive design of our Knowledge Base supports a flexible and user inclusive solution. In this paper we propose a feature list as follows: Dislike list, occupation, tagging, group travelling, Travel Mode, I care about, customized map, and keep the rating for each city, each city in every season, each city by every member and each interest by every member.

There are a few travel or none-travel related websites that provide a dislike list. Together with other useful suggestions, existing Travel Advisors may offer the items that a user does not like, to solve this issue the Knowledge Base should retain the list of disliked items and should not recommend these in the list of suggestions. Our Knowledge Base (FAN) keeps a track of dislikes for each user and their dependents.

The Knowledge Base (FAN) also keeps the occupation of each user, in case there are any items related to their occupation in the destination. For example, if the user's occupation is set to accountant or banking, the application will suggest money related museums in the destination, unless the user has already added this kind of museums in his/her dislike list.

To simplify the suggestion process and provide more accurate suggestions, the Knowledge Base accepts unlimited number of subcategories for each category of interest, so that each item can be tagged more accurately. For example, an item might be added to following tags: tour, small group tour, walking tour, day tour, short distance tour and historical tour, so that this item is shown in search results including any of its tags and their combinations.

The Knowledge Base (FAN) accepts members with unlimited number of dependents. A user profile has an owner but with different interests for each dependent of owner. For instance, a member may create profile and adds his/her children, partner and their interests to his/her profile. Moreover, this would enable the application to provide more accurate offers to single or family/group travelling. The Knowledge Base (FAN) also keeps the rating for each city, each city in every season, each city by every member and each interest by every member. Returning back to the case study, Alex is able to add his interests to the profile, choose his preferred transportation mode and enter the address of the specific hotel to receive suggestions for the closest places to the address.

In addition to this comprehensive Knowledge Base, we have developed an algorithm but its explanation is out of the scope of this paper, since our main focus is the definition and accuracy of features.

IV. Demonstration of Solution

To validate the solution, a system prototype has been

designed and developed. A few screenshots of the prototype are shown in this section of paper.

Fig. 1 shows the search box of the prototype. First six sections such as city, adults, child, days, hotel budget and preferred hotel rate are common to other travel advisor websites, but the last two options are exclusive to the prototype such as "Travel Mode" and "I care about". **"Travel Mode"** feature allows users to choose their transportation mode. **"I care about"** feature enables users to define the focus of application. Changing these options highly affect the suggestions. For example, in this case Driving and Price are selected, therefore the application will switch to its "Price Mode" to provide its suggestions, and all distances are calculated based on "Driving transportation mode" of Google Map.

Fig. 1. Travel details form

Fig. 2 shows the results of choosing **"Driving"** and **"Price"** features. First 3 items are the suggested items and the last 2 items are **"must see"** of the destination. Suggested items are ordered by their prices. As current application is a prototype of the system, only a few details of each item is shown in Fig. 2. To make the debugging easier, the ID of each item is shown rather than their names in this example. Average ratings are based on current member's rating, but to provide more accurate ratings in future, the system might retrieve the ratings from other websites.

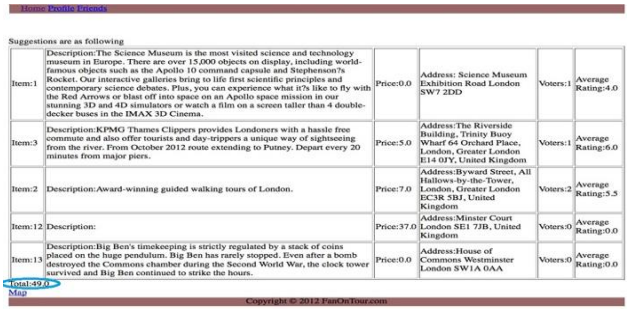

Fig. 2. Sample result of "Price Mode"

Another useful feature of the system that is not provided by other Travel Advisors is its **"customizable map."** Figures 3 and 4 demonstrate the location of the hotel and attractions on the Google Map. Three different options are provided to customize the map. Using "Both" option, user is able to see the location of the suggested hotel and other attractions, using "Attractions" option, the user is able to see the location of attractions, and as Figure 3 shows using last option enables user to find the location of the selected hotel on the map.

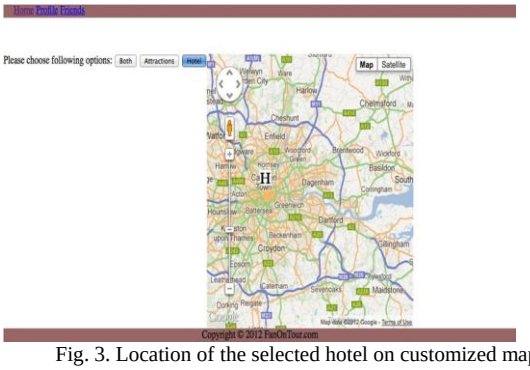

Fig. 3. Location of the selected hotel on customized map

Fig. 4. Location of the attractions on customized map

V. Validation of Solution

To endorse the proposed solution, twenty participants have been invited to separately test the system. Some users were participating alone and some others with their partners or friends, imagining they were travelling together.

All participants had basic computer skills, have already used at least two Travel Advisors and have never travelled to London. To conduct the testing**,** all participants have been asked to choose London, United Kingdom as their destination, ignore the flight and just look for the hotel and interesting places to see around. The testing was conducted in two phases.

A. First Phase

In this phase, participants had 20 minutes to use their favorite websites or search engines to search for places of their interest in the destination. Most of the participants started their search by looking into a number of Travel Advisors and at the end they used a search engine to look for additional places. They stated that their reason for using a search engine is they may have not found all places that are matched to their interests.

Observer recorded that 50% of participants tried more than 3 websites and 80% of participants asked for more time to look into results for other available options and believed that there might be more options available. Therefore, observer gave them 10 minutes extra to complete their search. Observer recorded that even after 10 minutes extra time they believed there are some other options that they might have not found. 5% of participants requested to call their friends to ask for their advice on useful websites.

Once they came up with the results, the observer recorded all of the selected places for each participants or group of

participants. Then, they were given 5 minutes break. During the break, participants were arguing with their partners that they have not covered all of their interests. No specific complaints have been recorded regarding single participants.

B. Second Phase

TABLE I: SYSTEM TESTING RESULTS

Index	Suggestions (%)	Features (%)	Simplicity (%)	Recommend to other? (N=0,M=50,Y=100)
1	95	90	100	100
2	85	90	100	100
3	100	100	100	100
4	80	85	100	100
5	100	100	100	100
6	100	100	100	100
7	85	80	100	100
8	100	100	100	100
9	60	80	95	0
10	95	100	100	100
11	100	100	100	100
12	90	80	90	100
13	100	100	100	100
14	100	100	100	100
15	90	95	100	100
16	75	60	90	100
17	45	30	90	0
18	90	100	100	100
19	100	100	100	100
20	95	100	100	100
Total	**89.25**	**89.5**	**98.25**	**90**

After the break they were asked to use the system. They were requested to create their profile and ask the system to come up with suggestions for the interesting places to visit. To create their profile they were asked about their interests and items that they disliked for all members of their group. Similar to the previous phase, they were asked to choose London as the destination, ignore flight details and look for the hotel and interesting places. All participants used the same computer to complete the testing. During the test, they did not need to ask any specific questions to the observer.

C. Results

Following table demonstrates the results regarding the user's satisfaction of the application and provided features. Each column shows the percentage of user's satisfaction of a specific aspect of the prototype. The average value of participants' satisfaction is calculated considering they participated the testing with their partner. Columns respectively provide the percentage of user's satisfaction on suggestions, user's satisfaction on features, and user perception of system's simplicity as well as if they would recommend the system.

In this phase, all users were surprised to have received their personalized suggestions in less than 3 minutes. Then users were asked to compare the results of the first and second phases and provide ratings of their satisfaction regarding the suggestions of the system. The average percentage of satisfaction on suggestions is 89.25% in Phase 2 and 56.65% in Phase 1.

The users were also asked to rate the features of the prototype and the average result is 89.5%. Those who were not satisfied with the features were complaining about the lack of public transportation mode and showing the place of items on the map rather than the routes to the origin.

Users also rated the questions asked by the system prototype during the testing. The percentage of satisfaction regarding the system's simplicity is 98.25%. They thought that the interface could have been better. At the end 90% of participants declared that they would recommend the application to others. The reasons for 10% for not recommending the system was relevant to either their level of satisfaction on suggestions, and/or not trusting the application, and/or not supporting public transportation mode that they believed would highly affect the travel budget.

VI. CONCLUSION AND FUTURE WORK

Reviewing existing Travel Advisors and analysing the problems of Internet users in locating proper information, we discussed that in spite of a large number of online applications; there is still a gap between users' requirements and the solutions provided. The aim of this project was to find the weaknesses of the current solutions and propose ways to overcome these problems. A review of popular websites and recent research studies gave us insights for a potential solution. In this paper, we proposed a solution that provides a comprehensive suggestion list based on comprehensive analysis on user's POI (Point of Interest), dislike list, distance, budget, transportation mode, and travel history. The proposed solution provides novel and practical features to users. A system testing has been also conducted to find out the weaknesses of the system as well as user's satisfaction with it. Twenty users participated in the testing and rated the solution. The user's satisfaction is 89.25%. 90% of users state that they will recommend the application to others. Although the solution provides the core features, there are still number of features that need to be added to the application, such as considering weather condition, age range and transportation mode to increase the level of user satisfaction. These can be detailed as follows:

A. Weather Condition

It would be useful to have access to one of the online weather forecasting systems to provide the weather forecast in the destination. Another feature to add could be to allow users to travel based on their preferred weather conditions. Although, it is possible to retrieve the popular cities in each season, using a simple query on the current Knowledge Base (FAN), this feature has not been implemented yet.

B. Age Range

It would be useful to provide features that allow users to search for popular cities based on their age range. This would also inspire another feature that allows users to ask questions such as where my age group or gender goes to in this season or on this budget.

C. Transportation Mode

Current suggestion list is based on distance. This feature could be extended to provide new suggestions such as asking

users to change their transportation mode to suggested transportation mode to save more time or money.

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