

# Tourist Place Suggestion System and Friend Recommendation using Behavior Analysis

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**Abstract—** This system is an attempt to suggest places to tourists where he could visit based on his location. In this system, as the user logs into his app using the assigned credential, Google maps are displayed to the user along with his location on the map. The user profile, photo collection, post, pages liked is analyzed. By this analysis user behavior is determined. Accordingly, his nearby tourist spots are recommended based on his preferences and interest. As the nearby tourist spots are notified the tourist, he clicks on the particular spot of his interest. Information regarding the place is shown to the person in detail along with things to be carried while visiting the spot. After he clicks on the recommended spot, a more detailed description of that tourist spot is displayed to the user. After actually visiting that place, the user can rate his experience regarding that place and can also upload photographs taken by him in that area. Provision of sharing those photographs with his friends are also available if needed. People having similar interest as that of user will also be recommended to user. Basically 'like-minded' people will be recommended to user based on behavior analysis.

**Keywords-** Tourist places; Friend Recommendation; behavioral analysis; Pattern matching;

## I. INTRODUCTION

People have to travel a lot for work purpose sometimes they get free time when their official schedule is over so they do not have enough time for planning. Most of them ask friends or search from the web. But there is large amount of information available online. This information maybe helpful but consumes a lot of time of user as many options are available online. To save time we use recommender system that generates suggestion by collecting user information such as preferences, interest and location. Recommendation system matches user database with available items from item-database and suggest recommendation accordingly. It will be very helpful if a system provides all information about nearby tourist places. Friend recommendation is another important feature of social network application to help people make new friends and expand their social circle. Existing method to recommend friend is mainly based in mutual friends. There is need to develop a system which recommend friends based on similar user profile and similar user preferences.

The main idea of our proposed system is to recommend tourist places and friends based on user's preferences and interest. This system is intended for people who have to spend their time on an unknown place and also expand their friend circle. The system is an android application similar to social networking application which allows the user to

update his profile, post his experiences and to comment on post. The system will analyze the user's behavior through user profile, posts, comments and likes. Users are tracked using GPS and by getting current location will be recommended with tourist places and friends having highest priority according to user preferences.

### A. TOURIST PLACE RECOMMENDATION

Our work is a personalized travel recommendation rather than a general recommendation. We automatically mine user's travel interest from user contributed photo collections, posts, comments, liked pages. The user's information collection is classified by Natural language processing (NLP). We recommend tourist places ranked according to user preferences. The complete information of the recommended places is provided to the user after selection of a tourist place the user provided with the shortest path for visiting that particular place. The user can also share his experience and give rating for places which can be helpful to the other users.

### B. RECOMMENDING STRANGERS BASED ON SIMILAR BEHAVIORS

In recent years making friends through social network application has become a popular feature in mobile social application. However, existing work focuses on recommendation of nearby strangers and mutual friends. A

unique challenge here is to recommend interested strangers for users having similar behavior as that of user. We focused on utilizing the user's behavior by his posts, comments and pages liked by user. In our system those stranger are recommended whose behavior matches with the behavior of user. The idea behind this system is that many users are likely to have similar level of interest for similar items. The set of description of content previously posted by user is evaluated and depending on users interest recommendation is done. This approach matches the 'like- minded 'people.

## II. REALATED WORK

In this section, we mainly introduce three aspects of related works (1) travel recommendation on various big social media; (2) personalized travel recommendation; (3) travel sequence and travel package recommendation. We also point out the differences between our work and existing works. GPS trajectory check-in data geo-tags and blogs (travelogues) are four main social media used in recommendation. User generated travelogues provide rich information. Kurashima et al. extracted typical user's travel sequences according to entries, associated with multimedia information of the routes. Besides travelogues, GPS and geo-tags are also widely utilized in travel recommendation. Zheng et al. conducted a series of works of travel routes mining and recommendation using GPS trajectory, and achieved promising results .However, comparing to the rich travelogues and geo-tags data on social media, GPS trajectory data are relatively difficult to obtain. Geo-tagged photos based automatic travel route planning works have attracted a lot attentions. Recently, multi-source big social media have shown their robustness. Liu et al. discovered Areas of Interest by analyzing geo-tagged image and check-ins data simultaneously. However, general travel recommendations only considered the popularity of POIs or routes. Recently, personalized travel recommendations have attracted more attentions. The three main approaches of personalized recommendation are Collaborative Filtering (CF) Markov Chains and matrix factorization . Location based CF firstly mined similar users according to location co-occurrence. For example, Clements et al. modeled the co-occurrence with Gaussian density estimation. Second, POIs are recommended according to similar users' voting. However, location based CF may face two problems. First of all, the computational complexity increases dramatically with large amount of users and locations, which is especially serious in big data scenario. Second, if the user has very few location records or most of these records belong to non-famous places, it would be very hard to mine accurate similar users. To solve these challenges, Jiang et al. proposed the Author Topic Model based Collaborative Filtering. They mined the category of travel topics and user topical interest simultaneously through Author Topic Model. Personalized travel sequence recommendation is more convenient for users than the individual POIs recommendation. The system enabled user to input personal

performance in an interactive manner. However it did not really automatically mine user's interest. What's more, in recent years, studies of the travel package recommendation which contained more attributes (e.g. time, cost, season) have shown more effective performance than works which only considered topical interest. Developed a cost aware model, and they analyzed the relation between cost and stay days. However, although these studies considered user's travel attributes, few of them really automatically. Recommendation systems that try to suggest items (e.g., music, movie, and books) to users have become more and more popular in recent years. For instance, Amazon recommends items to a user based on items the user previously visited, and items that other users are looking at. Netflix and Rotten Tomatoes recommend movies to a user based on the user's previous ratings and watching habits. Recently, with the advance of social networking systems, friend recommendation has received a lot of attention. Generally speaking, existing friend recommendation in social networking systems, e.g., Facebook, LinkedIn and Twitter, recommend friends to users if, according to their social relations, they share common friends.

## III. SYSREM OVERVIEW

In this section, here we are discussing overview of tourist place and friend recommendation system. As per system design, now a days people are widely using the various social media applications to search places and also for searching related people.

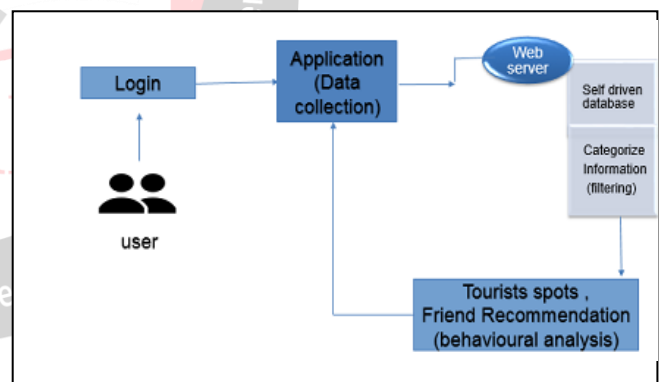


Figure 1. Example of a figure caption. (figure caption)

Figure 1 shows system architecture of our application which adopt a client server model where each client is a user and the servers are data centers. On the client side, user has to register into the application filling the basic credential. If the user has already register then he logs into application. The user's data can be accounted by his experiences, comments, liked pages and ratings given to various places. As a user continually uses the application, more and more data will be accumulated on which behavior analysis will performed. If the user is not active then behavioral analysis of the basic profile of the user is done.

On the server side four modules are designed to fulfill the task of tourist place and friend recommendation. The data collection module collects all the data of user from his profile and stores it in the database. Natural language processing, semantic analysis is carried out on the user information. Various filtering algorithm and classification techniques are applied on data. Based on this analysis the nearest tourist spot are ranked. The places are recommended to the user according to the rank of the places. User's behavior analysis is also used to recommend friends having similar behavior.

#### IV. EXPERIMENTAL EVALUATION AND ANALYSIS

##### A. Tourist Place Recommendation for a Specific User

In this section, we describe the experimental setup as well as the results. In the experiment, we randomly select a user whose id is 4 as the target user. User 4 has logged in and selected some tourist spots (shown to user when he logs into the application for the first time) which he finds interesting. After selection of tourist spot, we will recommend tourist spots instantly for the user 4 based on his interest and current location and according to other users' rating. Then, user 4 likes a particular post of spot id 56. In the database the id of the tourist spot (spot id: 56) liked by user 4 will be stored in the users table along with the user id 4. User 4 checked in details (loc id: 4104, longitude: 59.33, latitude: 18.04) will be stored. By analyzing the users table and the check in records, there are 8 tourist spots similar to the category of the tourist spot 56 liked by user 4 within 10 km radius area around loc id 4104 will be suggested to the user when he searches for tourist spots. User 4 is recommended by tourists spots which are nearby in radius of 10 km, by the tourists spots which are popular according to other users' rating and the tourist spots of his interest which are nearby. The check in details will help recommend nearby places. We find that there are 9 users which have already liked spot id 56. These users are regarded as the potential friends of user 4. If these 9 potential friends are not friends of user 4 then these people are recommended to user.

##### B. EVALUATION AND ANALYSIS OF RECOMMENDATION

To evaluate the performance of our recommendation, we compare our system recommendation with other social networking application's recommendation by recommendation on popularity, filtering.

**Recommendation by Ratings:** It is a recommendation which is based on ratings given to the particular spot by the other users registered with the application. Only the popularity of the spots according to the ratings is considered as the criterion of ranking. We measure the popularity of the tourists spots according to the number of users who rate the particular tourist spot.

TABLE I Comparison between proposed system recommendation and other recommendation systems

Recommendation	Proposed System	Other Systems
By Ratings	Present	Present in some systems only
By location based filtering	Present	Present
By Behavior	Present	Not Present
Friend Recommendation	Using Behavior analysis	Using mutual friends concept

**Recommendation by Location Based Filtering:** Location based filtering is a widely used method in recommendation system and it can be easily implemented. Firstly, all the tourist spots near to the user's location are taken into consideration and then filtered according to the user's interest. Then these locations are recommended to the user which is near to him and of his interest.

**Recommendation by Behavior:** We also compare other recommendation systems with our recommendation system. The main differences between other recommendation systems and our work are: (1) our recommendation model not only recommends the tourists spots which are nearby but also takes into consideration the interest of users, (2) in similar user mining part, we measure not only the user's interest, but also provide the shortest path, cost and season's attributes, (3) our users' are provided with friend requests of people who are sharing similar interest or similar behavior.

#### V. CONCLUSION AND FUTURE WORK

In this paper, we proposed a personalized travel recommendation system by measuring user's interest or likings from his posts, ratings given to the posts and also by recommending friends to people who same similar interest. Different from the other friend recommendation mechanisms relying on mutual friends concept in existing social networking services, our system extracted user's interest from his activities on the applications and used it for recommending potential friends to users if they share similar interest. We implemented our system on Android based smart phones and evaluated its performance by experiments. The results showed that the recommendations accurately reflect the interest of the users in selecting tourist spots.

However, beyond the current system a large amount of future work can be done. Firstly, we would like to evaluate our system on large field experiments. Secondly, in our system we may provide the facility of transport services (e.g., Ola cabs, Uber cabs) for more convenience. Thirdly, in the future we plan to enlarge the dataset, and thus we could provide recommendation for non famous spots also. We expect to incorporate our system into existing social

services (e.g., Facebook, Twitter, Instagram) so that our system can utilize more information for extracting user's interest, which should improve the recommendation experience in future.

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