Point of Interest Recommendation using User Preferences, Check–in History and Friend's Interest

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Abstract- **With the development of location sharing services there are many sites that provide Location based Services where people share their location, photos and reviews about those attractive locations. The shared locations form crowdsourced data which is used provide recommendation based on the personal interest for locations . Users have interests in the different location when they travel outside the regions depending on its popularity .These user interest as well as interest of local crowd is used for travel package recommendation. This vast check in data can be used for location or activity recommendation . Also it helps in advertisers to advertise their services when user reaches there .**

Keywords – Travel package, Point of Interest recommendation,collaborative filtering, Individual Preference.

I. INTRODUCTION

With the development in technologies Location-based social networks (LBSNs) are very popular today. Various Location based social networks are used like Gowalla, Facebook Place, FourSquare, JiePang etc. Using LBSNs users can upload their photos of particular locations, post their comments, share their experience with their friends ,share their location via check-in . This check in information is used for point of interests like restaurants , historical places, entertainment activities etc. The task of recommending unexplored new places is referred to as Point of Interest (POI) recommendation.

POI recommender system is different from majority of recommender system as it considers some additional aspects like geographical influence, frequency of check-in data at a particular location(which is usually sparse),social friends interest and temporal influence.

Generally POI is recommended in majority of cases based on check-in information which is obtained when users share their location on LBSNs. Applications use data associated with geo-tagged photos such as comments, location, weather condition etc. Privacy related to sharing of user photos by location based services needs to be addressed. Therefore, most application considers the spatial information that is extracted from each photo individually to improve the detailed information .POI recommendation and sequence of the POIs to be visited can be generated from metadata of geo-tagged data. Recommendation is done taking into consideration user preferences extracted from location based service such as at which time user visit which location and traveling interest.

The rest of the paper is organized as follows. Review of recommendation methods in section II.. Concluding remarks are given in section III.

II. REVIEW OF POI RECOMMENDATION METHODS

There is lot of study conducted on the travel package recommendation over spatial data and check in history.

Zhiwen u et.al [1] proposes a system that predict locations as per user's interest and generate travel package. User's preference changes with time and hence is dynamically extracted from LBSN .Thus user profiles are continuously updated. Location popularity is considered and rating is also given importance.Package recommendation consist of sequence of POIs useful for travel planning. First the system finds POIs which are near to current location of the user . Then it calculates preferences for these new POIs depending on what user likes based on information

obtained from user profile. This process is repeated for different time slots. Thus the system determine route to take and the travel package.

H. Yin et. al[2] uses Spatial –Temporal LDA model to recommend POIs at each region which are region dependent and according to user interest as well.It uses the fact that users tend to have different interest when they travel to different i.e. out of town regions. Check- in records of local users is mined to learn local crowd preferences .Check-in records from outsiders will be used to learn tourist preferences. Also an algorithm is developed to speed up the recommendation process. Daily activity done at different time is also considered .

Jihang Ye[3]   try to predict most likely category of user activity to be done next using check-in category information. By using mixed hidden Markov model this prediction is done. Category level modeling reduces the huge prediction space which is result of million of check in information. The system addresses the problem as two subproblems viz. predicting category of user activity at next step and predicting location depending on category distribution.

X.Lu [4] propose a system which predicts   sequence of travel routes to be taken using geotagged photos .These geotagged photos uploaded by various people are the aggregated to recover possible travel routes. Also user choice like duration and visiting time and destination type preferences etc are considered.

H.Yin et. al[5] proposes recommender system that recommend a set of locations and event by considering both individual user's interest and as well as preferences of local crowd . Helps the user while visiting unknown places. Offline module captures co-occurrence patterns and exploits Item contents. Online module takes user query to predict top recommendations for POIs but taking into consideration the interest of tourist and local crowd . It uses threshold algorithm for speeding up online process. It integrates collaborative and content into a probabilistic generative model.

Yonghong Yu et. al [6] surveys POIs recommendation in LBSN.It finds that POI recommendation uses Tobbler's Law that "everything is related to everything else but near things are more related than distant things". This means that people prefer to visit nearby location w.r.t. their current locations. User's preferences are reflected through check-in frequency for locations. Lots of Check-in information creates sparsity problem for POI recommendation. It shown by Ye ,Yin in their study that social influence has limited contribution on user's check-in behavior. It identifies 4 categories of POIs viz. pure check-in , geographical influence enhanced POI ,social influence enhanced POI   and temporal influence enhanced POI .The survey concludes that although all kinds of information is used, still check-in data, geographical influence and temporal influence have significant impact on recommendation quality.

Yin et.al [7] proposes to use probabilistic model named TRM for prediction of POIs taking into consideration semantic, temporal and spatial patterns of user's check-in activities . It is used for home town as well as unknown new place recommendation. The proposed system can effectively solve   sparsity and cold start problems .Semantic patterns minimizes the effect of data sparsity when analyzing unknown place recommendation and temporal patterns are used in hometown recommendation. Its limitation is it assumes user's interest are stable across geographical regions.

Zhiwen Yu et. al [8]   proposes a system that recommend a travel package by making use of crowd sourced data from LBSNs. Considering user choice of places to visit , it mines the check in records to find peculiar points of interest (POIs) characteristics. Constraints such as travel season , time period and starting location are also considered while recommending the travel package.

Qi Liu et. al[9]   built a system based on the characteristics of existing travel packages. The topic extraction is done considering the constraints like locations ,seasons ,tourist. These topics are then used for personalized travel package recommendation. The model is modified by mining patterns that exist in relationships among tourists in each group. Through experiments it is proved that the proposed model identify the features of the travel data which helps in more proper recommendation for travel packages.

Chen Cheng et. al[10] propose to find successive personalized POI recommendation in LBSNs. Two prominent properties in the check-in sequence: personalized Markov chain and region localization are used for this purpose. This system does not consider the temporal relations.

Gregory Ference et. al[11] proposes location recommendation system for out of town users by making use of user preference, social friend's influence and geographical closeness to the current location .. It uses the fact that similar users will like similar places .This fact is used for in-town users while recommendation is made for out of town users based more importantly on social influence

Bo Hu et. al[12] proposes a system model capturing both the social interaction and topic aspects of user check-ins. It explores areas of social network-based recommender systems. Based on friends' interests and their check-in behaviour , location recommendation is made.

Yan-Ying Chen et. al[13] propose to conduct personalized travel recommendation not only by using community contributed geo tagged photos but also specific user attributes like age, gender , cultural background ,profession etc. and type of people travelling with like family, friends, couple etc. Personalized recommendation is made with respect to user's interest and attributes.

III.CONCLUSION

In this paper, the problem of location recommendation based on the user location geo-tagged data is addressed which can be used to recommend locations matching a user's preference. Location and activity histories that we take as input provide meaningful location features and activity-to-activity correlation. Recommendation is made for home town as well as out of town users. Successive personalized point of interest recommendation is made to recommend top k new POIs to users.

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