International Journal of Research
Available at https://edupediapublications.org/journals
e-ISSN: 2348-6848
p-ISSN: 2348-795X
Volume 05 Issue-01
January 2018

A Study on Personalized Travel Sequence Recommendation on Multi-Source Social Media

Adari Srikanya & K. Venkata Ramana Ph.D

[1]M.Tech, Dept. of Computer Science and Systems Engineering, AU College of Engineering (A), Visakhapatnam, India
[2]Assistant Professor, Dept. of Computer Science and Systems Engineering, AU College of Engineering (A), Visakhapatnam, India

Abstract:

Now a days, traveling recommendation is important for users who plan for traveling. There are many existing techniques which are used for travel recommendation. This paper explains a personalized travel sequence recommendation system using travelogues and users contributed photos with metadata of this photo by comparing existing different technique. It recommends personalized users travel interest and recommend a sequence of travel interest instead of an individual point of interest. The existing system cannot complete the requirement i.e. personalized and sequential recommendation together, source and destination points for each tourist. Large amount of data can be collected from the Internet and travel guides, but these resources normally recommend individual Point of Interest (POI) that is considered to be familiar, but they do not provide sufficient information to the interest preference of the users or hold to their trip constraints. To solve the problem of providing personalized and sequential travel package recommendation, a topical package model is created using social media data in which automatically mine user travel interest with another attribute like time, cost, and season of traveling. The proposed system uses the travelogues and photos of social media which map each user and routes description to the topical package area to induce user topical package model and route topical package model. In addition, the huge volume of information makes it a challenge for every tourist to pay attention to a potential set of POIs to make a visit in any unknown city. After the tourist discovers an acceptable set of POIs to go to, it'll take abundant time and energy for him/her to make a brief outline of the suitable duration of the visit at every POI and the order in which to visit the POIs.To suggest personalized POI sequence, first famous routes are stratified as per the similarity between user package and route package. Then high stratified routes are more optimized by using social similar users travel records for more accuracy.

Keywords: Travel recommendation, Geo-tagged photos, and Social media, Travel metadata, topical package model, data mining, User preferences and multimedia information retrieval.

1. INTRODUCTION

In modern days, the rapid growth of cities has paved way for the development of a huge number of points of interest (POIs), e.g., stores, theatres, restaurants and residence that enliven and entertain the people, providing us with more choices of living experience than before. People routinely explore the city and neighborhood in their daily life and decide where to go based on their personal interests and the various choices of POIs. At the same time, making an efficient and effective decision among the large number of POI choices becomes an annoying problem for the user.However, such recommendation models are commonly based on the preference of most of the users on POIs, which ignore the user's personal preference. When compared to the places visited that are best suited to the user's interest, those places visited that are against the user's interest could bring bitter exploration experience in a situation when the user travels to a new place.Social media has come out continuous needs for automatic travel recommendation. This becomes an important problem in research and industry. Social

media offers great opportunities to address many challenging problems, like GPS estimation and travel recommendation. Travelogue websites offer rich descriptions about landmarks and traveling experience written by users. These data are not only useful for reliable POIs i.e. points of interest, travel routes but give an opportunity to recommend personalized travel POIs and routes based on user's interest. Existing studies on travel recommendation use the different types of social media data, GPS trajectory, check-in-data, geo tag and blogs which are used for mining famous travel POIS and routes [2][4]. The existing system for general travel route planning cannot well meet user's personal requirements. Personalized recommendation of travel system recommends the POIs and routes by mining user's travel history. Location-based collaborative filtering is the most famous method for the recommendation. In this collaborative filtering method, social similar users are mapped based on the location co-occurrence of previously visited POIs. And then POIs are ranked according similar users travel history. There are two problems in automatic travel recommendation when we compare existing travel recommendation approach. First, the recommended POIs should be personalized to user interest since different users may prefer different types of POIs. Second, it is important to recommend a sequential travel route that is a sequence of POIs rather than individual POI. Existing system on travel recommendation has not well solved the two problems. The first problem, most of the travel recommendation works only focused on user topical interest mining without considering other attributes like consumption capability of the user. And for the second problem, existing studies focused more on famous route mining but not considering user travel interest [1]. To solve the challenges sequential and personalized recommendation of travel location for the user, the new system proposes Topical Package Model method which automatically mines user travel interest from two types of social media data, different user-contributed photos and travelogues. For the first problem, it considers user's topical interest with the attribute like consumption capability and preference of visiting time of user and season. It is difficult to measure the similarity directly between user and route, proposed system build a topical package model and then map both user's and route's textual descriptions to the topical package model to get user topical package model (user package) and route package model (route package) using topical package space[1].

II. LITERATURE SURVEY

For travel recommendation system different system uses different types of data to mine user interested POIs, for this mining mainly four kinds of social media data are used that is GPS trajectory, check-in-data, geo tag and blogs for recommendation. User generated travel log provide rich information for a recommendation system.

Liu et al. discovered Areas of Interest by examining geo-tagged photos and check-ins data simultaneously. In this approach, by combining geo-tagged images and check-ins for the same city, for Area of Interest discovery and ranking those interest, to discover areas in a city in which popular attractive locations and popular locations are located for the travelers. A modified density-based clustering method is used in this approach which devised to identify an area of interest and proposes a novel joint authority analysis framework to the rank area of interest. The proposed framework in this approach simultaneously considers both the location-location transitions, and the user-location relations [5].

S. Jiang, presents an Author topic model-based collaborative filtering method for personalized travel

recommendations. Using author topic model user's topic preference can be mined from the textual descriptions attached with user's photos. Through author-topic model, travel topics, and a user's topic preference can be elicited simultaneously. In this recommendation system, POIs are ranked according to similar users, who share similar travel topic preferences. This method overcomes the problem in location-based collaborative filtering, without GPS records, in author-topic model based collaborative filtering method mine similar users accurately according to similarity of users' topic preferences [2].

J. Sang, explain the potential of location-based service to overcome with an advanced recommendation problem activity plan, which is to suggest a package of sequential activities related to user context and interest. This type of recommendation system of point of interest is a probabilistic approach in which recommended POIs are relevant to user context i.e. current location, time, and check-in and personalized check-in history of the user. This approach of recommendation is highly motivated from a large-scale commercial mobile check-in data analysis, to rank a list of sequential POI categories and different POIs. The approach enables users to plan continuous activities going from one place to another [3].

H. Huang describes collaborative filtering to mine GPS trajectories for providing POI recommendations. Three Collaborative Filtering methods are designed: simple CF, frequencies CF which considering visit frequencies of POIs, and frequencies sequence collaborative filtering. This method considers both users' preferences for POI and spatio-temporal behavior. Comparing simple location-based methods with the collaborative filtering methods, collaborative filtering provides more accurate predictions. It also considers visit frequencies, the popularity of POIs and spatio temporal motion behavior in that which POIs are visited in collaborative filtering can improve the predictive performance [4].

Ge et al. develop a cost aware route recommendation module in which two cost aware latent factor models are developed to recommend travel packages by considering both the travel cost and the tourist's interests and analyze the cost and stay days relation[7].

Q. Yuan studies travel package recommendation which focuses on more Attribute like time, the season of travel. In this travel recommendation the problem of time-aware POI recommendation, this recommends a list of POIs for a user to visit at a given time. To use both geographical and temporal influences in time-aware POI recommendation, proposes the Geographical-Temporal influences Aware Graph to model check-in records, geographical effect and temporal impact [8]. The proposed system recommends personalized travel sequence using social media data. For this recommendation system first mines POI and topical model from photos and travelogue and then route mined according travel history. It mine and rank famous routes based on the similarity between user package module and route package module. For accuracy then the top ranked famous routes optimized according to social similar users travel history for personalized travel sequence recommendation [1].

Xueming Qian explains personalized recommendation which considers two factors, user personal information and users' social group [13]. Subramaniya Swamy described a system which helps to user in finding tourist locations that users want to visit. A place is mined from available user contributed photos of that place available on photo sharing websites. [15].

Q. Liu presents personalized travel recommendation exploiting online travel information. In this method analyzed the unique characteristics of travel packages and create the Tourist Area Season Topic model, a

Bayesian network for travel package and tourist representation [11].

III. EXISTING SYSTEM

The existing system for travel recommendation uses different techniques for travel recommendation but did not consider popularity and personalization of travel route at the same time. Collaborative filtering is the most popular method for the recommendation. Location based collaborative filtering method for recommendation method considers only popular route location for recommendation [2]. The point of interest mining for recommendation is done in the existing system without considering users attribute like time, cost, season which is not mined automatically.

For travel recommendation in existing system data mined from different kinds of data contained on social media website for traveling, GPS trajectory, check-in data, geo-tags, and the travelogues of different user [6]. However, general travel route planning cannot complete users' personal requirements. Personalized travel recommendation recommends the POIs and routes by mining user's travel records. In a location-based collaborative method, similar social users are measured based on the location co-occurrence of previously visited POIs. Then POIs are ranked based on similar users' visiting records [16]. However, existing studies for travel recommendation haven't well solved the two problems, personalized and sequential travel recommendation of user preference. For the first problem, most of the travel recommendation works only focused on user topical interest mining but not consider other attributes like consumption capability of different users. For second problem existing studies focused more on famous route mining but not automatically mining user travel interest. It still remains difficult for existing travel recommendation system provide personalized and sequential travel recommendation. The existing system cannot give personalized recommendation to the user with the sequence of POI.

Disadvantages of Existing System:

The existing studies related to travel sequence recommendation did not well consider the popularity and personalization of travel routes at the same time. The multi-attributes of users and routes e.g., consumption capability, preferred season, etc. have not been mined automatically.

IV. PROPOSED SCHEME

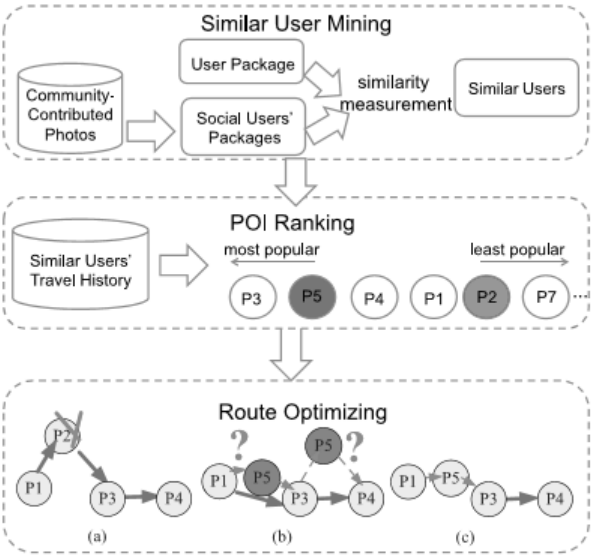
To solve the problem of the existing system for travel recommendation, this paper explains a Topical Package Model learning method to automatically mine user travel interest from two types social media data of traveling, users uploaded photos of traveling and travelogues i.e. user experience. This system overcomes the disadvantage of an existing system. This system considers user's topical interest and the attribute like cost, time and season of travel of user prefer and preference of visiting time and season of users. It is difficult to measure the similarity between user and route for travel, for this create a topical package model by mining travel-log and users uploaded photos. And compare both user's and route's textual descriptions to the topical package model to get user topical package model and route topical package model using topical package space. Map route module and user module to get recommendation results. To create the topical module the user's photo collection is divided into trip groups. Example photos and representative tags are displayed in recommendation module. Following fig4.1 shows the proposed system architecture for a recommendation.

V SYSTEM OVERVIEW

The system we proposed is a personalized POI sequence recommendation system which could automatically mineuser 's travel attributes such as topical interest, consumption capability and preferred time and season. In thissection, we briefly introduce the terms used in this paper: topical package space, user package and route package.Secondly, we provide the system overview. Topic package space is a kind of space in which the four traveldistributions of each topic are described by (1) representative tags mined from travelogues which describe POIs withinthe same topic; (2) the average consumer expenditure of the POIs within this topic, which are also mined from travelogues; (3) distribution of the visiting season of the twelve months mined by the "date taken" attached withthe community-contributed photos; (4) distribution of visiting time during the day from travelogues. The usage oftopic package space is to bridge the gap between user interest and the attribute of routes, since it is difficult todirectly measure the similarity between user and travel sequence. From mapping both user information and routeinformation to the same space, we get the quantitative standard to measure the similarity of user and routes.

VI. TRAVEL SEQUENCE RECOMMENDATION

In the wake of mining client bundle and course bundle in this segment, we present our travel courses suggestion module. It contains two primary strides: Courses positioning as per the comparability between client bundle and courses bundles and course enhancing as per comparable social clients' records. Accept R= {r1,r2,r3,… rn} is an arrangement of n travel courses mined disconnected. We rank these courses as indicated by the likeness between client bundle and courses bundles. On the off chance that the course meets client's advantage, the score will be high, and it would be positioned at the highest point of the courses. After POI and course positioning module, we get an arrangement of positioned courses ^ R. Here, we additionally portray the enhancement of top positioned courses as per social comparable clients' travel records.



POI Mining

So first we acquaint the route with mine POIs from swarmed geo-labelled photographs. POIs mining is a hot research territory in later years. We coordinate city name, for instance, London, with the literary labels of every photograph. It cannot ensure that all the photographs coordinating city name definitely have a place with this city, since group contributed photographs incorporate a great deal clamours. We additionally utilize the geo-area limitation. In the event that the GPS facilitate of the photograph is 500 km (between area level and nation level) far from the focal point of the city, we expel it. Subsequent to getting an arrangement of photographs of every city, second, we extricate POIs from these swarmed geo-labelled photographs toward every city by mean move bunching. At that point we pick the POIs in both the groups and the travelogue site. In this manner, these POIs have both GPS directions and travelogues portrayal, which could ensure the courses plan and courses bundle mining.

Depictive Image Mining

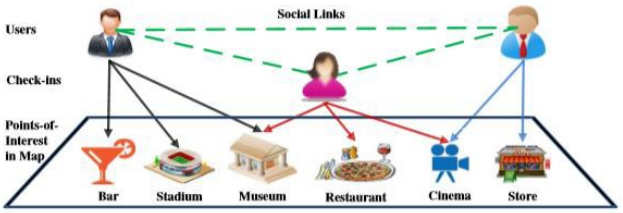
For POI keeping in mind the end goal to offer distinctive impression of the travel grouping, our framework likewise gives delegate pictures of the POIs on the course. We consider two variables of the delegate pictures. In the first place, we show agent perspectives utilizing the 4-D perspective The differing perspectives could offer more far reaching information of the POI. Second, as POIs may indicate very extraordinary attributes in various seasons, we give delegate pictures of each season. To accomplish season assorted qualities, we remove the "date taken" data from metadata of the picture, and gap the photographs into four seasons.

Season Matrix Mining

In the vision of getting POIs, there are arrangements of photographs with labels and timestamp marks. To season, we use the "month" in "date taken" to get the meeting allocation in the midst of the 12 month. The season vector of POI is defined as [spring, summer, pre-winter, winter]. Months from March to May have a place with spring and whatnot. As demonstrated by the structure of travelogues, for each subject, we ordinary over all the season movements of the POIs in this point. The season cross section is a N|4 matrix.

POI Design

The quick developing of Social systems gives an outsized amount of learning that permits the administrations in view of purpose of premium. In this approach, an investigation of most recent POI proposal disadvantage to anticipate the clients' present urban communities is to be recommended. The test is hard to take in the client's requested data and give customized proposal show. So usage of Author Topic Modelling approach conveys the customized travel proposal framework that is the augmented form of LDA procedure. This framework gathers the information of the creator and in this manner the urban areas. Through ATM, both the classification and the client's travel inclinations are mined by adjusting the dormant model all the while. The ATM overwhelmingly contains two phases, for instance, probabilistic generative model and Bayesian estimation illustrate. Through ATM, we can choose the probabilities of each word to different focuses. We additionally get creator theme grid for every one of the clients. At one point of every POI in an inert space, we accept that the Euclidean separation between the purposes of interests in the dormant space mirrors the move likelihood. With all POIs installed in a dormant space, our model gauges the sensible move probabilities of POIs.



Assessment on POI Package Mining

We look at the after-effects of POI bundle consequently mined with the data alluded to the official site. POI's topical intrigue, cost, time mined by our technique are signified as IP, CP, DP, while comes about because of the official site are meant as IO, CO, DO. We contrast our estimation comes about and the data of the official website. We utilize the outside connection of the official site on Wikipedia of the POI. To point, the first theme's precision rate is higher than 90 percent. The reason is that the agent labels in the point are separated from the

labels of POIs of this theme. To cost, we utilize the mean cost of "grown-up", "youngsters and senior", "understudy and debilitated grown-up" to show the official cost.The blunders of the cost are under 15 percent. To time, the greater part of the subjects of POIs like stop and gallery open from morning to evening, while to a few POIs, individuals as a rule visit them at night. For example, hotels and restaurants To season the meeting ubiquity disseminations of four case POIs: Central Park, Disneyland, Eiffel Tower and Yosemite National Park. We could see that diverse POIs are with various hot season.

VII CONCLUSION

In this paper, we proposed a personalized travel sequence recommendation system by learning topical package model from big multi-source social media: travelogues and community-contributed photos. The advantages of our work are 1) the system automatically mined user 's and routes' travel topical preferences including the topicalinterest, cost, time and season, 2) we recommended not only POIs but also travel sequence, considering both the popularity and user 's travel preferences at the same time. We mined and ranked famous routes based on the similarity between user package and route package. And then optimized the top ranked famous routes according tosocial similar users' travel records. However, there are still some limitations of the current system. Firstly, the visiting time of POI mainly presented the open time through travelogues, and it was hard to get more precise distributions of visiting time only through travelogues. Secondly, the current system only focused on POI sequence recommendation and did not include transportation and hotel information, which may further provide convenience for travel planning. In the future, we plan to enlarge the dataset, and thus we could do the recommendation for some non-famous cities. We plan to utilize more kinds of social media (e.g., check-in data, transportation data, weather forecast etc.) to provide more precise distributions of visiting time of POIs and the context- aware recommendation.

VIII FUTURE SCOPE

For future work, we can use more type of data for mining user interest and can provide information for a recommendation like hotel information and transportation detail for the user for convenience tour planning.

REFERENCES

[1] Jiang, Shuhui et al. "Personalized Travel Sequence Recommendation on Multi-Source Big Social Media". IEEE Transactions on Big Data 2.1 (2016), pp.43-56, 2016

[2] S. Jiang, X. Qian, J. Shen, Y. Fu, and T. Mei, "Author topic model based collaborative filtering for personalized POI recommendation," IEEE Trans.Multimedia, vol. 17, no. 6, pp. 907–918, Jun. 2015.

[3] J. Sang, T. Mei, J.-T. Sun, C. Xu, and S. Li, "Probabilistic sequential POIs recommendation via check-in data," in Proc. 20th Int. Conf. Adv.Geographic Inf. Syst., 2012, pp. 402–405.

[4] H. Huang and G. Gartner, "Using trajectories for collaborative filtering–based POI recommendation," Int. J. Data Mining, Modelling Manage., vol. 6, no. 4, pp. 333–346, 2014.

[5] J. Liu, Z. Huang, L. Chen, H. T. Shen, and Z. Yan, "Discovering areas of interest with geo-tagged images and check-ins," in Proc. 20th ACM Int. Conf. Multimedia, 2012, pp. 589–598.

[6] S. Jiang, X. Qian, J. Shen, and T. Mei, "Travel recommendation via author topic model based collaborative filtering," in Proc. 21st Int. Conf., MMM 2015, Sydney, N.S.W., Australia, 2015, pp. 392–402.

[7] Y. Ge, Q. Liu, H. Xiong, A. Tuzhilin, and J. Chen, "Cost-aware travel tour recommendation," in Proc. 17th ACM Int. Conf. Knowl. Discovery Data Mining, 2011, pp. 983–991

[8] Q. Yuan, G. Cong, and A. Sun, "Graph-based point-of-interest recommendation with geographical and temporal influences," in Proc. 23rd ACM Int. Conf. Inform. Knowl. Manage, 2014, pp. 659–668.

[9] Y. Gao, J. Tang, R. Hong, Q. Dai, T. Chua, and R. Jain, "W2go: A travel guidance system by automatic landmark ranking," in Proc. Int.Conf. Multimedia, 2010, pp. 123–132

[10] H. Kori, S. Hattori, T. Tezuka, and K. Tanaka, "Automatic generation of multimedia tour guide from local blogs," Adv. Multimedia Model.,vol. 4351, no. 1, pp. 690–699, 2006.

[11] Q. Liu, Y. Ge, Z. Li, E. Chen, and H. Xiong, "Personalized travel package recommendation," in Proc. IEEE 11th Int. Conf. Data Mining, 2011, pp. 407–416.

[12] X. Wang, M. Yu, L. Zhang, R. Cai, and W. Ma, "Argo: Intelligent advertising by mining a user's interest from his photo collections," in Proc. 3rd Int. Workshop Data Mining Audience Intell. Advertising, 2009, pp. 18–26.

[13] X. Qian, H. Feng, G. Zhao, and T. Mei, "Personalized recommendation combining user interest and social circle," IEEE Trans. Knowl. Data Eng., vol. 26, no. 7, pp. 1763–1777, Jul. 2014.

[14] Q. Hao, R. Cai, X. Wang, J. Yang, Y. Pang, and L. Zhang, "Generating location overviews with images and tags by mining user-generated travelogues," in Proc. 17th ACM Int. Conf. Multimedia, 2009, pp. 801–804

[15] V. Subramaniyaswamy, V. Vijayakumar, R. Logesh and V. Indragandhi, "Intelligent Travel Recommendation System by Mining Attributes from Community Contributed Photos", Procedia Computer Science, vol. 50, pp. 447-455, 2015.

[16] L. Pipanmekaporn and S. kamolsantiroj, "Mining Semantic Location History for Collaborative POI Recommendation in Online Social Networks", 2016 2nd International Conference on Open and Big Data (OBD), 2016..

Adari Srikanya
M.Tech, Dept. of Computer Science and Systems Engineering,
AU College of Engineering (A),
Visakhapatnam, India

K. Venkata Ramana Ph.D
Assistant Professor,
Dept. of Computer Science and Systems Engineering,
AU College of Engineering (A),
Visakhapatnam, India