PREDICTION OF SEQUENCIAL TRAVEL ROUTE RECOMMENDATION FOR JOURNEY PLANNING

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Abstract

Large amount of data can be collected from the Internet and travel guides, but these resources normally recommend personalized 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. The resources collected from the Internet and travel guides, normally recommend familiarized Point of Interest (POI). Such resources do not provide sufficient information to the users interest preference. Compared to the existing approaches, this approach is both personalized and also able to recommend a travel sequence. Topical package space is constructed which includes representative tags, the cost distributions, visiting time and visiting season of each topic. These resources are mined to bridge the vocabulary gap between user travel preference and travel routes. It utilizes two kinds of social media: travelogue and community-contributed photos. The textual descriptions of both user and routes are mapped to the topical package space to get user topical package model and route topical package model. First famous routes are ranked according to the similarity between user package and route package. Then top ranked routes are further optimized by social similar users travel records. The method suggests that the POIs are optimized to the users’ interest preferences and POI popularity.

Index Terms - Point of Interest, Topical package space, user topical package , route topical package travelogue, community-contributed photos

1. INTRODUCTION

There were two ways to tackle TS arrangement (TSA) problem, which included package tourism provided by travel agency who arranged entire travelling program. The other was independent tourism in which travelers arranged travelling details themselves after collecting the information. And independent tourism was getting popular, due to its tourism flexibility and customization. To cater for independent tourism customer, online traveler recommender system with particular tourism packages had been already developed by many travel agencies. These recommendations focused on query conditions. Intelligence travelling recommender system included two reasoning processes, the first was general reasoning and the second was exception one.

1.1 OVERVIEW OF THE PROJECT

Recommendation systems and adaptive systems have been introduced in travel applications to support the travelers in their decision-making processes. The interests are according to what people like doing more, some people can analyze in a better way than others while others might just learn what they are supposed to learn as it is. This approach is able to recommend a travel sequence rather than personalized Points of Interest (POIs).

1.1.1 Social Based Recommender System

A Tourist-Area-Season Topic (TAST) model was developed, which represents travel packages and tourists by different topic distributions, where the topic extraction was conditioned on both the tourists and the intrinsic features like locations, travel seasons of the landscapes. Furthermore, the TAST model was extended to the Tourist-Relation-Area-Season Topic (TRAST) model for capturing the latent
relationships among the tourists in each travel group. Finally, the TAST model, the TRAST model, and the cocktail recommendation approach were evaluated on the real-world travel package data. The cocktail approach was much more effective because experimental results show that the TAST model could effectively capture the unique characteristics of the travel data.

1.1.2 Collaborative Filtering

A composite recommendation system for travel planning which was based on the central idea that the usual recommender systems provide users with a list of recommendations and a single item under each recommendation like a book or a CD. However travel planning applications could get benefit from a system which could recommend packages whose items will be in the form of sets or sequences and it could be based on user preferences like budget, location etc. That raised the need for a system which could recommend top-k packages for users to choose from. This paper proposed a novel system, CompRec-Trip, which could automatically generate composite recommendations for travel planning. The system leverages rating information from underlying recommender systems, allows flexible package configuration and incorporates users' cost budgets on both time and money. It had a very good graphical user interface which could let users to customize the returned composite recommendations and took into account external local information. Thus user gets customized package which is more efficient than conventional recommendation system. It's better than even Hybrid recommendation strategy to produce an efficient result to the travelers. The collaborative tagging which mainly works in tagging the neighboring places by predicting the value for the suggested areas and this mechanism helps to capture effective results in the real world recommender system.

1.1.3 Location Based Social Network

People share their locations on location based social networks and write their likings and disliking about those places there. By these data i.e. crowd source digital footprints, one could guess user preference to locations. A prototype system was developed which obtained users travel demands from mobile client and thus generated travel package containing multiple points of interest and their visiting sequence. This approach dissipated and improvement in accuracy and diversity according to the experimental results.

1.2 OBJECTIVES OF THE PROJECT

The main objective of this project is to provide both personalized and sequential travel route for the users based on their POI’s. The main contributions are:

- To give a personalized travel recommendation rather than a general recommendation.
- Automatically mine user’s travel interest from user contributed photo collections including consumption capability, preferred time and season which is important to route planning and difficult to get directly.
- Ranking is performed based on the similarity between user package and route package, and top ranked famous routes are further optimized according to social similar users’ travel records.
- Takes advantage of the complementary of two big social media to construct topical package space.

2. EXISTING SYSTEM

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.

2.1 Graph-based Point-of-interest Recommendation with Geographical and Temporal Influences

The availability of user check-in data in large volume from the rapid growing location-based social networks (LBSNs) enables a number of important location-aware services. Point-of-interest (POI) recommendation is one of such services, which is to recommend POIs that users have not visited before. It has been observed that: (i) users tend to visit nearby places, and (ii) users tend to visit different places
in different time slots, and in the same time slot, users tend to periodically visit the same places. For example, users usually visit a restaurant during lunch hours, and visit a pub at night. In this paper, we focus on the problem of time-aware POI recommendation, which aims at recommending a list of POIs for a user to visit at a given time. To exploit both geographical and temporal influences in time-aware POI recommendation, we propose the Geographical-Temporal influences Aware Graph (GTAG) to model check-in records, geographical influence and temporal influence. For effective and efficient recommendation based on GTAG, we develop a preference propagation algorithm named Breadth-first Preference Propagation (BPP). The algorithm follows a relaxed breath first search strategy, and returns recommendation results within at most 6 propagation steps. Our experimental results on two real world datasets show that the proposed graph-based approach outperforms state-of-the-art POI recommendation methods substantially. The availability of historical check-in data in LBSNs enables POI recommendation service. In this paper, we focus on the problem of time-aware POI recommendation, which considers the temporal influence in user activities. We propose the GTAG to model the check-in behaviors of users and a graph-based preference propagation algorithm for POI recommendation on the GTAG. The proposed solutions exploit both the geographical and temporal influences in an integrated manner. We conduct extensive experiments over two real-world LBSN datasets. The experimental results show that the proposed methods beat all baselines significantly.

2.2 Drawbacks
- The existing studies related to travel sequence recommendation did not well consider the popularity and personalization of travel routes at the same time.
- It is far more difficult and time consuming for users to plan travel sequence than individual POIs.
- However, general travel route planning cannot well meet users’ personal requirements.

- Existing studies focused more on famous route mining but without automatically mining user travel interest.

3. PROPOSED SYSTEM
Automatic travel recommendation is an important problem in both research and industry. Big media, especially the flourish of social media offers great opportunities to address many challenging problems, for instance, GPS estimation and travel recommendation. Travelogue websites (e.g., www.igougo.com) offer rich descriptions about landmarks and traveling experience written by users. Furthermore, community-contributed photos with metadata like tags, date taken, latitude etc. on social media record users daily life and travel experience. These data are not only useful for reliable POIs (points of interest) mining, travel routes mining, but give an opportunity to recommend personalized travel POIs and routes based on user’s interest.

Online mode focuses on mining user package and recommending personalized POI sequence based on user package. First, tags of user’s photo set are mapped to topical package space to get user’s topical interest distribution. For example, if a user usually takes part in luxurious activities like Golf and Spas, he is more likely to be rich. Combine user topical interest and the cost, time, season distribution of each topic to mine user’s consumption capability, preferred visiting time and season. After user package mining, rank famous routes through measuring user package and routes package. At last, optimize the top ranked routes through social similar users’ travel records in this city. Social similar users are measured by the similarity of user packages.

In offline mode, the topical package space is mined from social media combining travelogues and community contributed photos. Four travel distributions (i.e., topical interest, time, season and cost) of each topic are described in topical package space. For example, the “date taken” of Flickr may be error with the influence of time difference. Sometimes observe in community-contributed photo the “date taken” of night scene is daytime. In offline module, mine POIs and famous routes from community
contributed photos, and obtain routes’ packages through mapping travelogues, which are related to these routes, to the topical package space.

3.1 Advantages
- Recommends not only POIs but also travel sequence, considering both the popularity and user’s travel preferences at the same time.
- The system automatically mines user’s and routes’ travel topical preferences including the topical interest, cost, time and season.

4. SYSTEM METHODOLOGY
The system considers not only user’s topical interest but also the consumption capability and preference of visiting time and season. A topical package space is build, and map both user’s and route’s textual descriptions to the topical package space to get user package and route package under topical package space.

4.1 Contemporary Package Model (TPM) learning method
The proposed system is a personalized POI sequence recommendation system which could automatically mine user’s travel attributes such as users interest, consumption capability, preferred time and season. The terms used are:
- Package space construction
- Route package
- User package

4.1.1 Package space construction
It is a kind of space in which the four travel distributions of each topic are described by (1) representative tags mined from travelogues which describe POIs within the 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 with the community-contributed photos; (4) distribution of visiting time during the day from travelogues. The usage of topic package space is to bridge the gap between user interest and the attribute of routes.

4.1.2 Route package

4.1.3 User package
User package is learnt from mapping the tags of user’s photos to topical package space. It contains user topological interest distribution, user consumption capability, preferred travel time distribution and preferred travel season distribution.

5. SYSTEM ARCHITECTURE
The existing systems did not consider the attributes like consumption capability. It focused more on famous route mining but without automatically mining user travel interest. The route recommendation is done with the help of Topic Modelling Algorithm to automatically mine user travel interest from two social media, community-contributed photos and travelogues. Automatically mine user’s travel interest from user contributed photo collections including consumption capability, preferred time and season which is important to route planning and difficult to get directly.

Fig. 1. System Architecture
5.1 Pre-processing the dataset

Data preprocessing describes any type of processing performed on raw data to prepare it for another processing procedure. Commonly used as a preliminary data mining practice, data preprocessing transforms the data into a format that will be more easily and effectively processed for the purpose of the user. The dataset consists of travelogues and community contributed photos.

![Fig. 2. Dataset Preprocessing](image)

5.2 User Package Model

User Topical Interest Mining Method

This module illustrates user topical interest mining method. Map the textual description (tags) of user’s community photos to the topical package space to present the user’s travel preference of different topics, which is defined as user topical interest distribution.

Cost, Time and Season Distribution Mining

The easiest way to obtain the time preference seems to analyze the “date taken” of the photo.

5.3 Route Package Model

Route Mining

To save the online computing time, travel routes and the attribute of the routes are mined offline. After mining POIs, to construct travel routes, the spatio temporal structure of the POIs among travelers’ records is analyzed.

Route Package Mining

It describes routes topical package model mining. Mine POI’s package including POI topical interest distribution, POI cost distribution, time distribution and season distribution. Then to each route, compute average for all the POIs on the route to get route topical package model.

5.4 Personalized Travel Sequence Recommendation

After mining user package and route package, travel routes recommendation module is introduced. It contains two main steps: (1) routes ranking according to the similarity between user package and routes packages, and (2) route optimizing according to similar social users’ records.

5.5 Routes Recommendation Module

Routes Ranking

Assume \( R = \{r_1; r_2; \ldots; r_n\} \) is a set of \( n \) travel routes mined offline. Rank these routes according to the similarity between user package and routes packages.

Route Optimizing

After POI and route ranking module, a set of ranked routes \( ^R \) are determined. Further describe the optimization of top ranked routes according to social similar users’ travel records. Firstly, introduce how to mine social similar users and their travel records. Then, the roads are optimized by social users’ travel records.

![Fig. 3. Route Package Space Construction](image)

6. CONCLUSION

The advantages of this project are 1) The system automatically mines user’s and routes’ travel topical preferences including the topical
interest, cost, time and season, 2) Recommends not only POIs but also travel sequence, considering both the popularity and user’s travel preferences at the same time. The famous routes are mined and ranked based on the similarity between user package and route package and then optimize the top ranked famous routes according to social similar users’ travel records.

7. REFERENCES


