Tourist Location and Travel Sequences from Geo-Tagged Photos- A Survey

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Abstract: Social tagging becomes increasingly important to organize and search large-scale community-contributed photos on social websites. There is an increasing tendency to adopt the information from these geo-tagged photos for learning to recommend tourist locations. In this paper we focus to recommend interesting tourist locations and interesting tourist travel sequences from geo-tagged photo collection. As users’ preferences to visit a location or multiple locations in a certain sequence could be affected by their current temporal and weather context.

Keywords: Context-aware query, Geo-referenced photos, Trip planning, Spatio-temporal data mining Travel sequence, Trip planning, Spatio-temporal data mining.

I. INTRODUCTION

Geo-tags of photos and videos provide a wealth of information about user behaviours and their potential is increasing, as it becomes ever-more common for images to be associated with location information in the form of geo-tags. This abundant location based data provided by geo-tagged photos and videos can be potentially used to provide a number of location specific information and services. Recently, there is an increasing tendency to adopt the information from these geo-tagged photos for learning to recommend tourist locations. For a tourist, before traveling to an unfamiliar city, the most important preparation is planning the trip. Without any prior knowledge, tourist must either rely on travel books, personal travel blogs, or a combination of online resources and services such as travel guides, map services, public transportation sites, and human intelligence to piece together an itinerary. It is difficult, time consuming and painstaking to find out the locations worth to visit and to figure out the order in which they are to be visited.

A tourist needs two kinds of information to understand an unfamiliar city and plan a trip to visit it. That are, (1) the most interesting locations within the city, and (2) given these interesting locations in a city, what are the interesting travel sequences among them? Furthermore, context factors such as time, location, or weather might affect the preferences of users in terms of visiting a location or multiple locations in a certain sequence. It is recognized that the preferences of users can be affected by their context, and the goal of context-aware recommender systems is to deliver recommendation of better quality by incorporating available contextual information of the user.

II. RELATED WORK

In GPS trajectory data is utilized (1) to extract the interesting locations, and classical travel sequences by employing Hypertext Induced Topic Search (HITS) based inference method to users’ location histories modelled by a tree-based hierarchical graph, and (2) to make location recommendations using the similarity of users in terms of their location histories. In order to provide location recommendations, location based services provide location recommendations by first clustering the user-location matrix, which represents the locations visited by each user, and then making location recommendations based on the user and location relationships.

Geo-tagged photographs available on these collections provide a quick overview of the interesting places at travel destinations. These photographs exhibit larger geographical coverage, and typically reflect the tourist trips of users sharing these images. This work is extended in by applying content and context based analysis for ranking clusters and finding representative images in a cluster divided the map using a grid so each cell represents a location. A density based clustering is used to discover tourist locations from photos' geo-tags in. Another work based on spectral clustering about identifying location as POIs is by. They proposed a self-tuning approach based on the cut cost similarity to eliminate the effect of parameters from spectral clustering investigated the place and event semantics of geotags, in addition to the representativeness. The proposed approach can automatically determine whether a tag corresponds to a “place” or an “event”. A “place” tag is defined as a one that exhibits significant spatial patterns, while an “event” tag refers to a one that exhibits significant temporal patterns. A method to recommend tourist locations based on user's travel history in a collaborative filtering manner. Locations are ordered based on their popularity and then popularity score is linearly combined with personalized score weighted by the similarities between the active user and other users.
III. PROBLEM DEFINITION

We give definitions of some basic concepts and terms.

Definition 1. (Geo-tagged photo) A geo-tagged photo p can be defined as $p = (id, t, g, X, u)$ containing a photo's unique identification, id; its geo-tags, g; photo's timestamp, t; and the identification of the user who contributed the photo, u. Each photo p can be annotated with a set of textual tags, X. Geo-tags g of photo p is the coordinates of the geographical region where photo p was taken.

Definition 2. (Photo collection) Collection of all photos, contributed by all tourists can be represented as $P = \{P1, P2,..., Pn\}$ where $P(n=1...n)$ is the collection of photos contributed by user u.

Definition 3. (Context-aware query) A context-aware query Q is defined as $Q = (t, w)$, where t represents temporal context and w denotes weather context.

The problem of recommending interesting tourist locations and tourist sequences in geo-tagged social media is formulated as: given a collection of geo-tagged photos $P = \{P1, P2,..., Pn\}$, (1) how to find tourist locations within a city, infer the semantic of tourist locations, summarize and then rank the tourist locations based on their interestingness for recommendations, and (2) how to build users' travel histories, extract trips made by users, and mine travel sequence patterns for interesting travel sequence recommendations. To be specific, we aim to utilize the photos collections contributed by users publicly for interesting tourist locations and interesting tourist sequences recommendations with respect to user's current context.

IV. TOURIST LOCATION AND TRAVEL SEQUENCES

A tourist location can be defined as a uniquely represented geographic area within the city: such as a sightseeing spot, a store, a restaurant, which is popular for tourists to visit and take photos. Formally, tourist locations identified by clustering geo-tags of photos’ collection $P$ can be represented as $L = \{l1, l2,..., ln\}$. Each element $l = \{pl, gl\}$, where $pl$ is a group of geographically clustered photos, and $gl$ are geographical coordinates to represent the centroid of photos' cluster $pl$, and are computed from group of geo-tags associated with the photos in the cluster $pl$.

A profile of a tourist location $l$ can be represented as Profile($l$) = {VI}, where VI represents the set of visits made by users to location l and describes that how the location l has been engaged and perceived by different users. The next step is to build the history of contexts in which tourist locations have been visited.

A user trip is a sequence of locations visited by a user according to temporal order and the difference between the visiting times of two consecutive locations in the sequence is not greater than a tripdur threshold. More specifically, a user trip can be denoted as $TR= l1, l2,..., ln$, where li.t $li \leq t. and li.t - li - 1. t$ tripdur. A travel sequence pattern s is a pair $(sp, f)$, where $sp=\{l1, l2,..., ln\}$ is the sequence of locations, and $f \geq$ minsup is the sequence frequency. The sequence frequency is the number of users visiting the locations according to the order in the sequence. We elaborate how to mine the significance of locations by giving weight to tourists according to their expertise in different categories of places using travel sequence database.

In tourist location, to process the context-aware query $Q(t,w)$ made by user u, to rank the tourist locations based on user's current context and significance of tourist locations consists of two main steps: an initial filtering step retrieves $t$ number of tourist locations of target city from the tourist locations database LDB that have high context-dependent popularity in the current context, thus producing a filtered set of tourist locations $L'$.

In travel sequence, the processing of context-aware query $Q(t, w)$ for context-aware travel sequences proceeds as a two-step approach: an initial filtering step retrieves travel sequence patterns from SDB that belong to target city, and have higher probability to meet the contextual constraints given in the query, thus producing a filtered set of travel sequence patterns $S'$.

V. CONCLUSION

In this review paper it shows interesting tourist locations and interesting tourist travel sequences (i.e., sequence of tourist locations) from a collection of geo-tagged photos. This work demonstrated the exploration of the use of geo-referenced user generated content (UGC) to provide location-aware tourist information. UGC and other found data may not be “scientific” (in a narrow sense), but there is a wealth of these data available. This work motivates a number of important directions for further research. One modification which could be in future versions for better recommendation is to introduce some space-time constraints to the recommendation results.

REFERENCES


