

Enhanced Contextual Recommendation using Social Media Data

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ABSTRACT

Making recommendations to a user which are more refined, personalized and contextually appropriate, has become an important problem in a variety of domains. Contextual Point of Interest (POI) recommendation is of particular relevance for travel and tourism, to suggest places to visit for a user traveling to a particular city. I propose an approach which frames contextual POI recommendation as a traditional document ranking problem, where I represent each POI as a document. I will investigate whether social media data such as Twitter can supplement the recommendation process. I follow the TREC Contextual Suggestion track setup for my evaluation methodology.

Document Representation: A significant aspect of this research investigates the generation of an enriched document representation for a POI, by harvesting different information (descriptive, categorical, temporal etc.) from multiple sources. Foursquare and Yelp are two of the most popular location-based social networks (LBSNs) among researchers to crawl additional data such as ratings and reviews to better predict a POI's appropriateness. Along with this, social media such as Twitter can be a very useful source of information for contextual suggestion. For instance, if someone tweets an image of an amazing view of the Eiffel tower from a hotel balcony, it indirectly indicates that this hotel could be of interest for someone looking for accommodation close to the Eiffel tower with good views. This study will explore "To what extent can a document representation for a POI be effectively generated using the POI's web-page and related LBSN pages?".

Location Specific Contextual Suggestion: Location is a piece of context information that is specifically important in the context of travel and POI recommendation as people have to physically travel to the POI, thus location plays a crucial role. E.g. It may not be suitable to recommend "Johnnie Fox's Pub" (a very popular Irish pub and tourist attraction, but quite far away from Trinity College, Dublin) when the user is near to Trinity College. Recommending Johnnie Fox's Pub is not reasonable, unless the person in question has a car, and/or particularly likes this type of attraction and as a result may be willing to consider travelling to reach it. Even more interesting, at what point (recommendation score) does a POI become so interesting/relevant for the individual, that it should be recommended even if it is difficult to get to and would take significant effort.

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Document Ranking: Inspired by the work of Efron et al. [2], I propose a log-linear retrieval model for document ranking using Kernel Density Estimation (KDE), taking space (POI locations) into account, which will eventually rank POIs. Almost everything in this world can be defined by time and space. It is possible to play with time and/or space (location) for a query and/or document. This model gives us the flexibility to combine heterogeneous evidence and integrate arbitrary features. I will try different ranking approaches and/or fusion techniques to find the best model which will explore "What is the most effective ranking approach for location-aware contextual POI recommendation?".

Further Context from Opinions: Tweets often take the form of a "review", giving insight into the tweeter's spontaneous opinion about what they interact with in their lives, be it a museum, hotel, restaurant etc. One way to capture this unique type of users' opinion is to conduct a task-based user study similar to [1] where users are given a set of different tasks to search for and mark tweets that give useful information about entities/POIs in given context(s), such as "in winter", "with spouse", "weekend break" etc. This task is completed in a controlled environment to capture users' clicks and ratings and to create a query log dataset that can provide useful (contextual) information about POIs. I will also explore NLP techniques to recognize and disambiguate entities (POI) from tweets and analyse the sentiment towards each entity that is present as an opinion. Calculating a sentiment score for the POI in a given context will allow me to incorporate the effect of social media in my retrieval model which will eventually answer "To what extent can social media data supplement the recommendation process, and what are the challenges in capturing valuable contextual information about POIs from the opinions present on social media, such as Twitter?".

CCS CONCEPTS

• **Information systems** → **Personalization**; *Information retrieval diversity*; *Recommender systems*; **Probabilistic retrieval models**;

KEYWORDS

Contextual Recommendation, Kernel Density Estimation, Microblogs

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