Research Paper

Spatial and temporal analysis of accommodation preference based on online reviews

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ABSTRACT

Knowledge about where tourists stay during their trips, and at what time of year, is important to destination marketing, management, and planning. However, analysis of the spatial and temporal accommodation patterns of tourists often requires comprehensive data sets, advanced analytical techniques, and massive cost and workloads. Perhaps for these reasons few studies have attempted to construct a profile of tourists' accommodation preferences. This study contributes to the extant literature by introducing a method that utilizes spatial and temporal data embedded in online travel reviews to address these challenges. The effectiveness of the proposed method was demonstrated in a case study of inbound tourists in Hong Kong, using a large data set comprising 115, 649 online reviews of 314 hotels. Particular location preferences for hotel stays were revealed for the whole market and for different source markets. The seasonal demand patterns for different market segments (i.e. business, family, couple, and solo) from different regions of the world were identified. The presented approach is valuable for hotel practitioners, who can use online reviews as a source of information regarding tourists' choices regarding hotel stays.

1. Introduction

Understanding the spatial and temporal patterns of tourist activities is important to tourism practitioners in destination management and planning (Vu, Li, Law, & Ye, 2015). Where tourists stay is a major factor in these activities, as tourists tend to spend a large proportion of their time in the neighborhood of their hotel, and a hotel's location influences the places where tourists are likely to visit, the volume of visitors at all but iconic attractions, and diurnal visitation patterns (Shoval, McKercher, Ng, & Birenboim, 2011). Importantly, hotel location appears to be a key factor in travelers' choices about where to stay. For instance, Chu and Choi (2000) found that a convenient location was one of the most important factors for both business and leisure travelers when choosing a hotel. Lockyer (2005) and Chan and Wong (2006) reaffirmed the importance of location in customers' hotel selection process. Travelers' choices based on location also influence hotels' practical operations, as meeting customer requirements and offering customer convenience directly raised customer loyalty (Chou, Hsu, & Chen, 2008).

Despite the efforts that have been made, tourism practitioners still face challenges in destination management due to a limited understanding of tourists' accommodation preferences and travel patterns. More specifically, tourists' hotel location preferences appear to be strongly influenced by characteristics of the traveler (e.g. traveling for leisure or business) and the travel (e.g. first-time or repeat tourist) (Chan & Wong, 2006). Many factors could influence the final selection of a hotel. While some tourists might choose hotels near or convenient to the places they are interested in visiting, others might choose a hotel at a less central location in exchange for a lower price. While first-time tourists who are unfamiliar with a destination might stay in a hotel booked by a travel agent, others might book a hotel room online by themselves. A comprehensive understanding of where different types of tourists stay is important so that local businesses can tailor their products and services to better accommodate tourists' expectations. Unfortunately, prior research failed to establish a location preference profile for different types of tourists, not to mention the temporal travel patterns of their hotel stays. In sum, scant research has analyzed tourists' location preferences in a comprehensive and in-depth manner that considered spatial and temporal patterns.

Recent advances in Internet technology, especially Web 2.0, have allowed a massive amount of user generated data to be available on travel review platforms such as TripAdvisor, Airbnb and Yelp. These

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platforms have provided scholars with rich data resources for analyzing tourists' hotel selection decisions (Li, Law, Vu, Rong, & Zhao, 2015). Recent studies have leveraged the content of posts or reviews to identify tourist interests or opinions that may reflect their hotel preferences (Li et al., 2015; Li, Law, Vu, & Rong, 2013). However, little attention had been paid to the spatial and temporal aspect of the reviews, which could provide important clues about location of stay and seasonal travel patterns. Namely, hotels on travel review sites are usually accompanied by their geographical information, such as address. When a tourist posts a review of a particular hotel, this implicitly indicates his/her location of stay: based on the address, the hotel's location can be identified as part of a certain area within a city. In addition, some travel review sites allow users to provide information about when they stayed at the hotels.

To facilitate research on accommodation preference, this paper presents a method for analyzing tourists' location of stay and seasonal travel patterns based on spatial (location) and temporal (time) information in hotel reviews. The effectiveness of the proposed method is demonstrated in a case study focusing on inbound tourists in Hong Kong. Hong Kong was selected for the case study because Hong Kong is a major tourism destination, attracting millions of visitors from around the world every year. In 2016 alone, 56.65 million tourists visited Hong Kong (Hong Kong Tourism Board, 2016). Using a large-scale data set of more than 115,000 reviews of 314 hotels, the study constructed a profile of the location of hotel stays for different groups of travelers based on travel type and country of origin, and explored temporal patterns in travel. For convenience, the terms *tourist* and *traveler* are used interchangeably to refer to people who wrote the online reviews on the travel platforms

The rest of the paper is organized as follows. A literature review is provided to summarize research on hotel location and temporal patterns in tourism as influences on tourist activities, along with a discussion of the limitations of extant research. The method of extracting and analyzing spatial and temporal information from online reviews is described, followed by a case study on inbound visitors in Hong Kong. The final sections address the practical implications of our results, the study's limitations, and directions for future research.

2. Literature review

2.1. Role of location in hotel selection

There has been increasing research on how tourists select a hotel, especially with regard to location. This interest stems from evidence that hotel location is an important influence on tourists' behavior. An early study by Rivers et al. (1991) showed that frequent visitors to a hotel reported that convenience of location and overall services were the strongest influences on their choice of accommodation. Location also appears to be an important element for a hotel's practical operations and success. Chu and Choi (2000) compared business and leisure travelers in terms of the factors that were important in their selection of a hotel. They found that the convenience of a hotel's location was the top selection criterion for both travel groups. Shoval et al. (2011) combined a traditional questionnaire approach and GPS trackers to investigate the influence of hotel location on tourist activities, visited places and visitation patterns. Li et al. (2013) found that the importance of location in hotel selections varied among different travel groups. For example, for business travelers from Asia and Europe, location was not a high priority, whereas for their North American and Oceania counterparts it was.

Multiple factors appear to influence tourists' selection of a hotel based on location. Gray and Liguori (1998) suggested that tourists use several criteria for location selection: traffic convenience and accessibility, local economic environment, car park facilities, public facilities, geographic factors, natural resources, and the size of the location. To provide a deeper understanding of hotel location selection in Taiwan,

Chou et al. (2008) put forward a hierarchical location selection model and listed 21 criteria that tourists use to make a selection. The 21 criteria could be divided into four themes: traffic conditions, geographical conditions, hotel characteristics, and operation management. Convenient transportation to tourism scenic spots was found to be one of the three most important criteria in the evaluation model.

Tourists' choices about accommodation appear to be influenced by the location of the accommodation, and different types of visitors may give priority to different locations in the same area. A hotel's location in turn has a significant influence on tourist activities and experience. Understanding this influence is thus crucial for development of local businesses within a destination. However, a method to effectively capture location of stays has not been reported in the tourist literature. Therefore, it has not been possible to conduct a comprehensive study of the locations of hotels where different tourist groups stay.

2.2. Temporal pattern and tourism activity

Understanding the temporal pattern of tourist arrivals is important for appropriate management of local tourism businesses. Researchers have suggested that seasonality is inextricably linked to tourism activity (Pegg, Patterson, & Gariddo, 2012) and reflects recurrent fluctuations in tourism demand (Ridderstaat, Oduber, Croes, Nijkamp, & Martens, 2014). Seasonality can be divided into two aspects: a *natural factor* involving climate, weather and seasons of the year; and an *institutional factor* linked to holidays and available leisure time, travel habits and motivations, and the hosting and timing of events. Information about seasonality can help hotel practitioners make decisions about promotions that might attract business year-round. Periods of low capacity may produce low use ratio of infrastructure and contribute to unemployment; periods of high capacity can damage the local ecosystem and annoy local residents (Pegg et al., 2012). Peak seasons and low seasons might be different for different types of travelers. For instance, family travelers may be more likely to travel during public holidays or school vacations, but business travelers may not be. Seasonality also could be influenced by cultural background: for instance, the peak seasons for travelers from China might not be the same as those from the U.S. because of different public holidays.

Attempts have been made to study the temporal pattern of tourists' arrivals based on statistical annual and monthly data. Lim and McAleer (2000, 2001, 2002) and Goh and Law (2002) studied the seasonal fluctuation of tourists using various times-series methods. Shoval and Cohen-Hattab (2001) also used time-series data to analyze the temporal trends or spatial distribution of hotel accommodation in Canada, Spain, and Israel. Cuccia and Rizzo (2011) used monthly official data collected by the local tourism office to study tourism seasonality in cultural destinations such as Sicily in Italy. Kulendran and Dwyer (2012) used quarterly data on arrivals to Australia to model seasonal variation in tourism due to climate variables, such as maximum temperature, humidity, and hours of sunshine. Yang and Wong (2013) analyzed the spatial distribution of tourist arrivals in China using secondary data obtained from the 'National Statistical Bureau of China', 'China City Statistical Yearbook', and 'CNKI Statistical Yearbook Database'. These studies relied on traditional data-collection approaches such as surveys and questionnaires, which are costly and time consuming. The applicability of the methods was thus limited to specific countries and regions where the surveys were conducted. There is thus a need for alternative data sources that provide an inexpensive and efficient means for studying temporal patterns of tourism on a large scale, such as the method of online review discussed in the next section.

2.3. Online hotel reviews as a data source

Social media was the most popular buzzword in the 21st century (Kietzmann, Hermkens, McCarthy, & Silvestre, 2011; Leung, Law, Van Hoof, & Buhalis, 2013). Social media has been defined as a set of