Where to go next? Mapping Multi Destination Trips Using Geotagged Photographs

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Abstract

Spotting multi-destination trips can be used for destination marketing to create potential marketing synergies. The purpose of this study is to identify multi destination trips in Austria based on the geotagged photos retrieved from the Flickr website. Based on this data, trip patterns were classified as follows: (1) Single destination trips (57%); (2) Base camp trips (30%) and (3) Regional Tour trips (13%). In addition, cluster analysis was conducted to categorize the cities. The first cluster encompasses the eastern part of the country, which includes larger cities such as Vienna and Salzburg and the second cluster refers to the western part of Austria. This can be used for practical purposes, for instance, the destinations which are in the same clusters can have joint marketing campaigns or create shared hiking trails.

Keywords: *multi destination trips, destination marketing, Flickr, geotagging.*

Track: *Tourism marketing*

1. Introduction

Planning a trip involves many decisions such as where to go, how to get there and what to do at the destination. Among all these decisions, the destination choice is one of the first ones to be decided by the travellers. In order to maximize the efficiency of trips, travellers visit more than one destination at a time. Multi destination trips can be in various forms such as visiting towns that are on the way to the main destination or visiting nearby regions during the stay at the main destination.

Multi-destination trips are interesting for research in order to see which destinations are combined together in one pleasure trip. Some examples of previous research concerning travel patterns and spatial movement of travellers include Lue, Crompton, and Fesenmaier (1993), Stewart and Vogt (1997), Tideswell and Faulkner (1999) and Hwang and Fesenmaier (2003). Knowing which destinations are visited during a trip is invaluable information for destination marketing organizations whether a CTO or a regional tourist office. This knowledge enables the identification of potential marketing synergies, especially for destinations that do not have enough attractions to attract visitors on their own (Tideswell & Faulkner, 1999). For instance, the destinations can have joint marketing campaigns by creating a hiking trail that includes two or more destinations or advertise on each others' destination websites.

The purpose of this study is identifying multi destination trips in Austria based on geotagged photos. Surveys are conducted by destinations to collect data from travellers; however there is no data in Austria that shows multi destination trip patterns. The data to identify these trip patterns can be retrieved from geotagged photos of the Flickr website. Using this information, the multi destination trips were identified, multi destination tourists were categorized and destinations were clustered according to trip patterns.

2. Literature review

According to Leu, Crompton and Fesenmaier (1993) (LCF model), there are five multi destination travel patterns: (1) single destination, in which only one destination is visited; (2) en route travel, includes trips on the way to the main destination or on the way back home, excluding side trips; (3) base camp trip, involves side trips around the main destination; (4) regional tour, includes trips in a region with stops in smaller destinations in the area; and (5) trip chaining pattern includes multiple destinations in a region and between regions (Leu, Crompton & Fesenmaier, 1993).

Stewart and Vogt (1997) utilized the multi destination traveller categorization by Leu, Crompton and Fesenmaier (1993) to identify multi destination trip patterns in Branson, USA and their results indicate a slightly different traveller classification than the LCF model. They differentiated trip chaining and regional tours, in which trip chaining is a bigger tour that includes different regions in North America whereas regional tours capture smaller regions than trip chaining.

Social media gives the individuals the opportunity to share their thoughts, photos, videos and information on various topics. Flickr is a popular online photo sharing platform, which has 51 million registered users, who upload approximately 4.5 million photographs per day (http://advertising.yahoo.com/article/flickr.html, [Dec. 04, 2012]). In the case of Flickr, which combines photographs, travel and social media, travellers can have an insight into attractions, landscape, people and life at the destination. Flickr is commonly used among travellers. According to Lo, McKercher, Lo, Cheung, & Law, (2011) 89% of Hong Kong residents who take pleasure trips take photographs and 41% of those post them online. Moreover, 40% of these travelers use Flickr and other similar types of photo sharing websites (Lo et al., 2011). Flickr data can be used to identify the exact locations where tourists have been, new trends among tourists such as visiting lesser known attractions, and to identify

points of interests. Analyzing Flickr data that covers a bigger region, such as a country, also gives the opportunity to see the domestic multi-destination travel patterns.

Previous research has used Flickr to identify user movements. Mamei, Rosi, & Zambonelli, (2010) developed a system that makes recommendations on places to visit for first time visitors to a destination based on the previous behavior of the visitor. In addition Flickr data was used to evaluate the satisfaction of recreational tourists in Taiwan (Shyang-Woei, 2010), to create automated travel itineraries (De Choudhury et al. (2010), to identify places visited, duration of stay and panoramic spots of the destination (Popescu, Grefenstette and Moellic, 2009), to spot points of interests (Kisilevich et al., 2010) and to create dynamic maps based on user location (Chen, Battestini, Gelfand, & Setlur, 2009). Mobile phone information in combination with the photos uploaded on the web regarding Rome was used to create a map that shows the density of tourists in the city and where tourists go (Girardin et. al., 2008).

3. Methodology

Flickr data is publicly available on the internet. In order to collect the data, an application was developed by one of the authors that was using Flickr REST API (http://www.flickr.com/services/api/, [Dec. 04, 2012]). The application retrieves the meta-data for the photos of a destination in a specific time frame. The data collected for this study includes the user ID, longitude, latitude and the date of the photo taken and uploaded. The longitude and latitude of the photo is defined in two different ways. The first one is done automatically by Flickr when the user anchors the photo on a map; Flickr assigns geolocations to the photo. The second one comes directly from the user's camera, which has built-in GPS systems and assigns the geolocations of the photo automatically (Pereira, Vaccari, Giardin, Chiu, & Ratti, 2011).

The data collection was carried out between March and July of 2012, which were taken between 01.01.2007 and 31.12.2011. The sample included photos tagged by Flickr users within Austria and all of its regions (Vienna, Burgenland, Carinthia, Styria, Upper Austria, Lower Austria, Salzburg, Tirol and Vorarlberg).

The next step was to differentiate residents' photos from tourists' photos. The date of the first photo uploaded and the last photo uploaded by the same user is taken as the time span spent at the destination. If this time span was less than 30 days, the user was defined as a tourist; otherwise the user was defined as a resident. (Girardin et al., 2008). The final study sample includes 1.183.889 photos from Austria from between 01.01.2007 and 31.12.2011, of which 883.465 photos were from residents and 300.424 photos were from tourists. The total number of unique users is 27.901, of whom 20.067 are identified as tourists.

The following step was to classify the tourists based on their trip patterns. The classification is carried out by calculating days spent at each destination as well as the number of cities visited. A modified version of trip patterns classified by Leu, Crompton and Fesenmaier (1993) was used in this study. The trips are classified as flows: (1) Single destination trips include tourists who visit one destination and spend multiple nights; (2) Base camp trips include tourists who spend multiple nights at one destination and spend single nights in other destinations; and (3) Regional tours include tourists, who spend more than one night in more than one destination.

Finally, cluster analysis was conducted to categorize the similar regions and cities according to tourists who had been to the same destinations.

4. Results

The results of multi-trip patterns indicate that 57% of tourists are on a single destination trip and on average they spend 5,08 days in Austria; 30% of tourists are base camp travellers and they stay 5,56 days on average, followed by regional tour travellers which make up 13% of our study sample and stay 8,11 days in Austria.

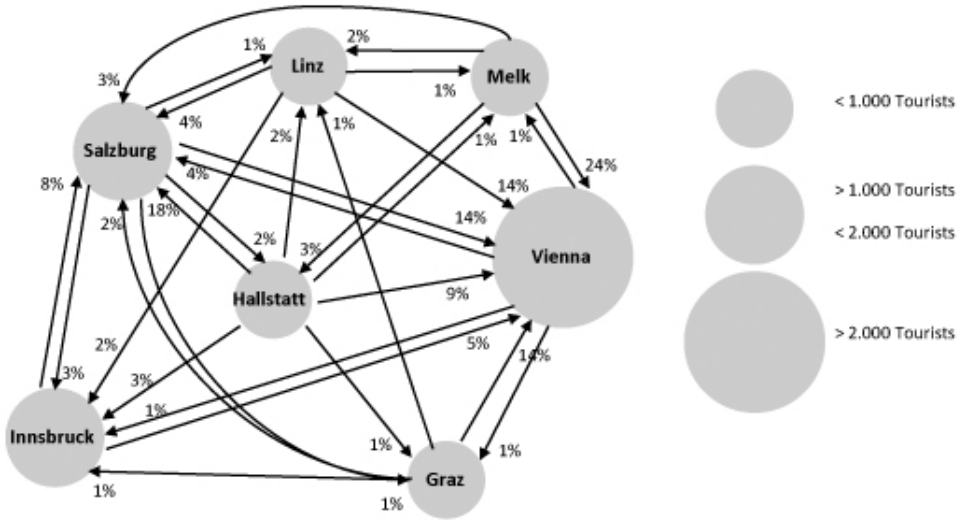

Figure 1. Multi destination travel patterns of tourists in Austria

Figure 1 is a map of multi destination travel patterns based on our sample. The size of the bubbles indicates the number of tourists who were at the destination. The arrows show the direction and percentage of tourists who originated from that destination. For instance, Vienna has the highest number of multi destination tourists and the arrows indicate that tourists who are on a trip in Austria visit Vienna from Melk, Linz, Salzburg, Graz, Innsbruck and Hallstadt. However, only a minor percentage of the tourists in Vienna go outside of Vienna for overnight stays. Tourists who had been to Vienna are most likely to visit Salzburg (4%), followed by Innsbruck (1%), Graz (1%), Linz (1%), and Melk (1%).

The difference between cities based on different tourist types can be seen from the results as well. For example, Vienna is mainly a single destination city where the highest percentage of the tourists stay only in Vienna (67%) and 21% are base camp travellers. On the other hand, Melk is a regional tour city where most of the tourists who visit Melk also spend multiple nights in other cities (58%), whereas only 1% of Melk tourists are single destination travellers. The difference can be seen as well on the time spent at the destination. For instance, compared to Vienna, in which tourists spend 2,55 days on average, Melk tourists stay on average 1,08 days. Moreover, in Salzburg 47% of tourists are base camp travellers, who stay mainly in Salzburg but also spend a few nights in other cities, followed by regional tour travellers (32%) and 22% of visitors to Salzburg only stay in Salzburg when they visit Austria. Similar to Melk, Hallstatt, which is a small city located near Salzburg, has mainly regional tour travellers (49%) and base camp travellers (47%).

Additionally, cluster analysis was conducted to group the cities that were visited by the same tourists. Since the focus of this study is multi destination trips, the tourists who visited at least two different cities were included in the sample for the cluster analysis, which included 7.920 tourists. In addition, only the cities that had more than ten tourists were included in the cluster analysis to have a more generalized data set. After computing the Yule coefficient for each pair of cities, the similarity matrix is transformed into a distance matrix to run a hierarchical cluster analysis using Ward's method.

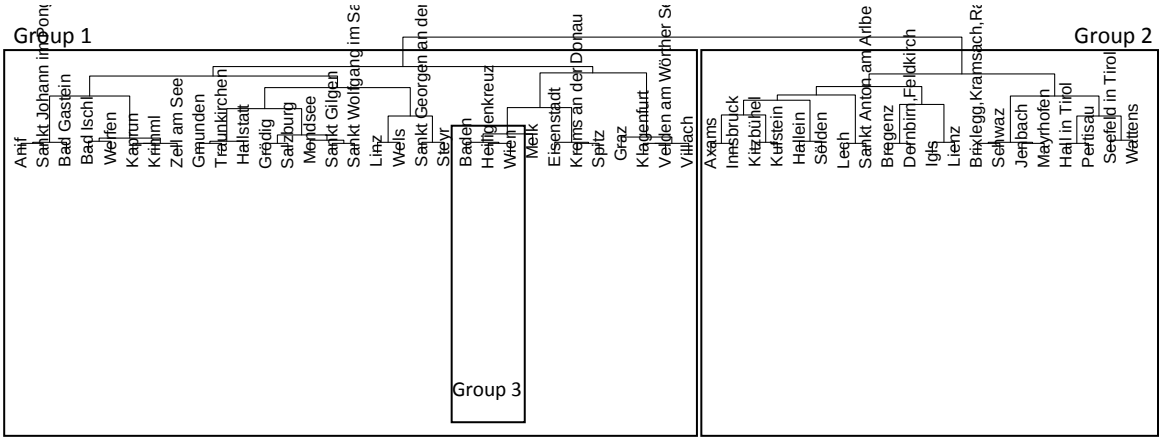

Figure 2. City and region clusters

The cluster analysis results indicate that there are two main clusters based on multi destination trips taken in Austria. The first cluster (Group1) encompasses the eastern part of the country, which includes larger cities such as Vienna, Graz, Linz and Salzburg and the second cluster (Group2) refers to the western part of Austria Alpine area. Group 1 consists of mainly cities and urban areas where city tourists travel whereas Group 2 includes mostly rural areas, which are known for nature and outdoor activities such as skiing and hiking. By investigating more in detail, it can be seen that the cities that are close to each other are clustered first such as in Group 3. It includes Baden, Vienna, and Heiligenkreuz, which are within 40km distance. This result also indicates the importance of regional joint marketing campaigns.

5. Conclusion and implications

The results of this study show that tourists visit places which are in close proximity when they are on a multi destination pleasure trip in Austria. The data for multi destination trips taken in Austria does not exist and this study shows how multi destination travel data can be retrieved from Flickr and used in destination marketing. Multi destination trip data is important especially for smaller destinations, which may not have as much of a marketing budget as larger cities such as Vienna and can join forces if they know the same travelers are visiting both destinations. For instance, the destinations can have online ads on each other's DMO websites. In our case Hallstatt can advertise on Salzburg's website since it is a base camp city and many visitors to Salzburg may also visit Hallstatt. Depending on the features of the regions, a hiking trail or a wine trail that includes both of the destinations can be created. There are different ways of marketing destinations and knowing which destinations are visited by the same tourists during their vacation is important information for national destination marketing as well. The Austrian National Tourist Office can use this information to create bundles of smaller and larger destinations according to the results of the cluster analysis.

Future research may include using cluster analysis including seasonality aspects such as classifying winter tourists and summer tourists and identifying the destinations they visit. Also, travel patterns on a wider region, which includes surrounding countries can be identified. In addition, conducting cluster analysis to find the subcategories of each traveler type, such as base camp traveler sub categories, would be interesting.

This study is based on the assumption that all the travellers who upload photos on Flickr, take and upload photos in all the different cities or regions they visit. However, in reality this may not be the case. Moreover, the travellers who upload photos on Flickr may not be representative of the whole traveller sample.

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