

Predicting Mobility Patterns of Tourists Based on Social Media User's Profiles

*¹M Vineela, ²Vankudoth Sravani, ³Gudupally Sai Preethi

¹Associate Professor, Department of CSE, Bhoj Reddy Engineering College for Women, Hyderabad, India

^{2,3}Students, Department of CSE, Bhoj Reddy Engineering College for Women, Hyderabad, India

ARTICLE INFO

Article History:

Accepted: 20 April 2023

Published: 11 May 2023

Publication Issue

Volume 10, Issue 3

May-June-2023

Page Number

70-73

ABSTRACT

Social media is becoming a powerful data source for analytics in many domains. This is owing to an increase in quantity and quality of extractable data. Quantitatively, more people seem to find themselves as social media users. Quality wise, users tend to share more personal information and experiences which makes their profile more informative. Tourism is one of the main industries to utilize social media, as users posts useful information as they are traveling. The purpose of this research is to identify tourists from social media data and analyze their movement in the Netherlands. This study can be divided into three tasks. Firstly, the detection of tourists, followed by extracting their movement and lastly creating route recommendations for tourists.

Keywords : Social Media, Analytics, Domains, Recommendations, Posts.

I. INTRODUCTION

International tourist arrival in Europe has almost doubled in 20 years, increasing from 261.5 million people in 1990 to 476.6 million people in 2010(BBC-GSCE Bitsize: The growth of Tourism, n.d.). Tourism is an influence most countries in the world are subject to, benefit from, and need to deal with. While inherently tourism has a positive effect, countries with open borders and less control over the flow of people are having more and more trouble with an increasing number of tourists, leading to overcrowded areas and constantly sold out accommodations. This is not only a problem to countries and cities themselves, but also to tourists who prefer having an insight on how other tourists travel. Accordingly, the last years have shown

a trend of continuous growth in the use of social media. Social media became one of the main communication channels for tourists, to either stay in contact with acquaintances or share their experiences. As a result of this trend, an increasing amount of information about tourists can be obtained from social media and used for research. One field of research related to tourists on social media is the study of tourist mobility. To analyze and research tourist mobility from social media posts, one needs to collect posts from an individual or a group of tourists and extract locations from these posts. This presents a couple of interesting problems, such as identifying tourists solely based on their social media activity or retrieving locations from posts.

In accordance to that, Twitter introduced geotagged tweets in 2009, which enabled the matching of tweets

with their location by latitude and longitude (Sarver, 2009). The usage of geotagged tweets increased to a total of approximately 0.77% of 400 million tweets made in 2012. Thereby, 60% of tweets have been posted with mobile devices, feasible for geotagging (Fujita, 2013). For this research, Twitter will be used to analyze tourist movement within the Netherlands, as Twitter provides easily accessible public data, geotags and profile information. Tweets made in the Netherlands will be retrieved and explored to answer the main research question: Can tweets or social media posts map out tourists movement in a country? As this question has both a functional and a research focused side, once the mapping is done, analysis needs to be conducted on the result, leading to further research questions:

- Are there popular routes or travel patterns within the country?
- Can routes be suggested to tourists based on other tourists' preferences?

Secondarily, this research will explore possible solutions on the question of whether tourists can be identified based on social media posts. While this secondary question does not explore tourist mobility, it is an essential part of dealing with tourists on social media, and can prove beneficial to researchers aiming to explore social media and tourism.

II. RELATED WORK

The field of tourism has attracted many researchers either for the purpose of building recommender systems (Lucas et al., 2013) or to analyze tourists spatial behavior (Edwards & Griffin, 2013). Therefore, data can be retrieved from surveys, GPS, as well as social media platforms, that become more and more important with an increasing usage.

Furthermore, social media has been the focus of various researchers, such as Fujita (Fujita, 2013) who described a collection and visualization of geographical Twitter data. Additional research concerning tourists on social media has been conducted by Munar et al.

(Munar & Jacobsen, 2014) who analyzed motivations for sharing tourism experiences through social media. This field of research gets extended by the consideration of geotagged social media posts. Among others, Van Canneyt et al. (Van Canneyt, Schockaert, Van Laere, & Dhoedt, 2011) proposed a system to recommend attractions to tourists based on their location, retrieved from social media posts. Panizio (Panizio, 2015) examines Twitter data in order to get insights on aggregation patterns of tourists near Points of Interest, as Cranshaw et al. (Cranshaw, Schwartz, Hong, & Sadeh, 2012) have shown a correlation between user locations and the proximity to Points of Interest. For this purpose, tweets made in Amsterdam have been analyzed. Lee et al. (Lee, Wakamiya, & Sumiya, 2013) proposed an approach of aggregating patterns on a larger granularity by characterizing cities in Japan based on tweets. Global movement patterns, deduced from geotagged tweets, have been analyzed by Haweka et al. (Hawelka et al., 2014). The application of geotagged tweets reaches as far, that real-time event detections systems have been introduced, by Sakaki et al. (Sakaki, Okazaki, & Matsuo, 2010) to detect earthquakes.

In this paper, we extend upon a heuristic tourism detection method (Habib & Krol, 2017), recognizing tourists based on the time difference between their first and last tweet. This approach is extended by using co-training to detect tourists by among others analyzing the content of their tweets. Different visualization models will be created in order to explore tweets and tourist movement. Lastly, methods to suggest travel routes to tourists will be presented.

III. PROPOSED SYSTEM

The distinction of tourists from residents formulates the basis of the following project. Therefore, multiple approaches will be followed and evaluated. Firstly, tourists will be distinguished from residents by comparing the date of their first and last tweet, assuming that residents tweet within a larger timespan.

IV. CONCLUSION

Timespans of various length will be examined. Furthermore, the mobility and movement of tourists will be analyzed. This analysis will be carried out focusing on tweets made in 2016.

Another approach to detect tourists is to consider the content of their tweets. Therefore a model can be deployed, which analyzes the use of words and hashtags to recognize patterns, that indicate tourists. This approach includes the creation of a feature vector for each user (e.g.: average time between tweets, time between first and last tweets, most used words), using initial constraints with timestamps to tag an underlying set of tourists and finally classifying tourists using Support Vector Machines. The content of tweets can be transported into analyzable data using term frequency matrices for each user, enriching the feature vectors with these matrices.

Furthermore, the profile of users can indicate whether they are residents of the Netherlands or tourists. It can be checked whether the location of a user, mentioned in his profile, matches with the Netherlands, as more than 80% of all Twitter users provide this type information (Graham, Hale, & Gaffney, 2014). In order to process the geographical information of tweets, their geotag will be retrieved to enable a visualization on a map. Additionally, the path of movement for each tourist will be generated. Further geographical information about boundaries within the Netherlands will be retrieved from OpenStreetMap1, enabling the assignment of tweets to areas. Therefore, the following aspects will be addressed within this project:

- ✓ The formulation of algorithms to distinguish between residents and tourists
- ✓ The creation of visualization approaches
- ✓ The analysis and the detection of patterns
- ✓ The outcome could show how tourists move around in the Netherlands and provide a base for future research on targeted advertisements or services, as well as improving the awareness of tourists.

This paper provides a conclusive answer to the research question: Can tweets or social media posts map out tourists movement in a country? Tourist detection is possible using both a constrain based approach and a machine learning classification approach. If tourists are detected, and their tweets are geotagged, a clear flow of their movements can be visualized in both a macro level, using heat maps, arrivals as well as departures, and in a micro level, by directly mapping each user's path within the Netherlands. Additionally, proving the viability of social media posts in tourism research, this paper also offers a solution to tourists who would like to explore the Netherlands. Using machine learning and graph traversal, the paper presents two solutions to recommend routes a tourist should take when visiting the Netherlands. While this approach is purely location based as of the writing of this paper, a time constraint can easily be introduced to fulfill a tourist's time based requirements.

V. REFERENCES

- [1]. Buhalis, D.; Law, R. Progress in information technology and tourism management: 20 years on and 10 years after the Internet—The state of eTourism research. *Tour. Manag.* 2008, 29, 609–623. [CrossRef]
- [2]. Hays, S.; Page, S.J.; Buhalis, D. Social media as a destination marketing tool: Its use by national tourism organisations. *Curr. Issues Tour.* 2013, 16, 211–239. [CrossRef]
- [3]. Xiang, Z.; Gretzel, U. Role of social media in online travel information search. *Tour. Manag.* 2010, 31, 179–188. [CrossRef]
- [4]. Buhalis, D.; Amaranggana, A. Smart Tourism Destinations Enhancing Tourism Experience Through Personalisation of Services. In *Information and Communication Technologies in Tourism*; Tussyadiah, I., Inversini, A., Eds.;

- Springer: Cham, Switzerland, 2015; pp. 377–389. [CrossRef]
- [5]. Buonincontri, P.; Micera, R. The experience co-creation in smart tourism destinations: A multiple case analysis of European destinations. *Inf. Technol. Tour.* 2016, 16, 285–315. [CrossRef]
- [6]. WTCF. WTCF Global Report on Smart Tourism in Cities. World Tourism Cities Federation. Beijing. 2019. Available online: <https://prefeitura.pbh.gov.br/sites/default/files/estrutura-de-governo/belotur/2020/wtcf-global-report-on-smart-tourism-in-cities.pdf> (accessed on 25 January 2022)
- [7]. Femenia-Serra, F.; Ivars-Baidal, J.A. Do smart tourism destinations really work? The case of Benidorm. *Asia Pac. J. Tour. Res.* 2021,26, 365–384. [CrossRef]
- [8]. Xiang, Z.; Fesenmaier, D.R. Big Data Analytics, Tourism Design and Smart Tourism. In *The future of tourism: Innovation and Sustainability*; Xiang, Z., Fesenmaier, D., Eds.; Springer: Cham, Switzerland, 2017; pp. 299–307. [CrossRef]
- [9]. Wang, K.; Lin, C. The adoption of mobile value-added services: Investigating the influence of IS quality and perceived playfulness. *Manag. Serv. Qual. Int. J.* 2012, 22, 184–208. [CrossRef]
- [10]. Kotoua, S.; Ilkan, M. Tourism destination marketing and information technology in Ghana. *J. Destin. Mark. Manag.* 2017,6, 127–135. [CrossRef]
- [11]. Lamsfus, C.; Martín, D.; Alzua-Sorzabal, A.; Torres-Manzanera, E. Smart Tourism Destinations: An Extended Conception of Smart Cities Focusing on Human Mobility. In *Information and Communication Technologies in Tourism 2015*; Tussyadiah, I.; Inversini, A., Eds.; Springer: Cham, Switzerland, 2015; pp. 363–375. [CrossRef]
- [12]. Choe, Y.; Fesenmaier, D.R. The Quantified Traveler: Implications for Smart Tourism Development. In *Analytics in Smart Tourism Design*; Xiang, Z., Fesenmaier, D., Eds.; Springer: Cham, Switzerland, 2017; pp. 65–77. [CrossRef]
- [13]. Wang, D.; Xiang, Z.; Fesenmaier, D.R. Adapting to the mobile world: A model of smartphone use. *Ann. Tour. Res.* 2014, 48, 11–26. [CrossRef]
- [14]. Boes, K.; Buhalis, D.; Inversini, A. Conceptualising smart tourism destination dimensions. In *Information and Communication Technologies in Tourism*; Tussyadiah, I., Inversini, A., Eds.; Springer: Cham, Switzerland, 2015; pp. 391–403. [CrossRef]
- [15]. Molinillo, S.; Anaya-Sánchez, R.; Morrison, A.M.; Coca-Stefaniak, J.A. Smart city communication via social media: Analysing residents' and visitors' engagement. *Cities* 2019, 94, 247–255. [CrossRef]

Cite this article as :

M Vineela, Vankudoth Sravani, Gudupally Sai Preethi, "Predicting Mobility Patterns of Tourists Based on Social Media User's Profiles", *International Journal of Scientific Research in Science, Engineering and Technology (IJSRSET)*, Online ISSN : 2394-4099, Print ISSN : 2395-1990, Volume 10 Issue 3, pp. 70-73, May-June 2023.
Journal URL : <https://ijsrset.com/IJSRSET2310312>