The Integrated Tourism Analysis Platform (ITAP) for Tourism Destination Management

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INTRODUCTION

Tourism in the European Union (EU) is the third largest socio-economic activity and the world leader in tourism destinations, making an important contribution to the EU's gross national product and employment. Tourism is an important sector for sustainable local development, by preserving and enhancing cultural and natural heritage. The European Commission estimated that European tourism industries are almost 2 million, most of them small and medium-sized (SMEs), providing work for 5% of the total EU workforce (Juul, 2015).

In the tourism sector, data analytics using information on online platforms are the order of the day, offering results and value conclusions. Even so, according to the literature review (Wong, Law & Li, 2017), the work done so far, has focused on technical aspects of the analytical, and few of them in the tourist management. Of these, a part has focused on understanding the mobility of tourists based on different criteria, such as space, time, and the profile of visitors (Vu, Leung, Rong & Miau, 2016; García-Palomares, Gutiérrez & Mínguez, 2015; Kádár & Gede; 2013; Leung, Vu, Rong & Miau, 2016). And so, understand the relationship between types of attractions and types of tourists or the difference between visitors and residents. Other works have also used the digital track, to make tourist recommendations (Xu, Chen & Chen, 2015; Okuyama & Yanai, 2013; Jiang, Yin, Wang & Yu, 2013; Kurashima, Iwata, Irie & Fujimura, 2013). But only one work (Zhao et al., 2017) has been found that analyzes the images to predict the interests of visitors and another recent work (Cai, Lee & Lee, 2018), which takes into account the factors of space and time sequentially.

Online social networks have features common to several user profiles, such as demographics (location, age, gender, education) and interests (religion, sports, politics, music, literature). Such a profile can act as an integration element with other elements (Boyd, 2008). Features such as updates and comments allow the users to evaluate the content and to serve as recommendations to other users. The metadata gives the possibility to create references such as the Twitter hashtags (#) with titles, descriptions, category and keywords, from which, it's possible to filter or extract information.

The existing opinion extraction systems nowadays are created to analyze the English language and for specific text topics, such as movies or other type of product reviews. More than just evaluating the positive or negative feelings of the sentences, the data of social networks can provide more information regarding particular aspects, for example, tourism. Opinions in social networks have been generally classified according to its polarity (positive or negative) and intensity (number of opinions). Sentiment

analysis is a huge step concerning machine learning and the latest trends include the development of routines allowing clarifying the lexical subjectivity of options. The analysis of information from social networks comprehends two main areas: Social Network Analysis and Sentiment Analysis. The first concerns pattern detection for descriptive or predictive relations between the elements of social networks (Curran, O'Kane, McGinley & Kelly, 2010), assuming that these patterns are important parts of the users' interaction with the real world. It's known as link mining since not only identifies categories, but also relationships and attributes of the analyzed nodes, from which it's theoretically possible to predict the node and link connection to other nodes, via neighboring algorithms and even clustering of nodes with common structure. Sentiment Analysis is the text treatment according to the development of algorithms and lists to represent statements as positive, negative or neutral regarding a given topic (Pang & Lee, 2008). The World Wide Web allowed developing more studies in this field, since the production of information led to Big Data. The answer to Big Data was the development of techniques to extract relevant information through the interpretation and classification of contents from websites, blogs, forums, open data portals and social networks, among others. Liu (2010) presented the steps that comprise the sentiment analysis process: extraction of relevant information; identification of objects and features of the referring opinions; classification of sentiments; and visualization.

We intend to combine opinion mining with the geospatial location of a touristic review to enable a context-aware analysis of the ITAP data. Instead of overwhelming the user by showing the details first, we visually group similar patterns together and aggregate them by applying Self-Organizing Maps in an interactive analysis application. Thus, ITAP will be able to cope with unstructured touristic user feedback data and shows location dependencies of significant terms and sentiments. The capabilities of our approach are shown in a case-study regarding "Intelligent Analysis of tourists' behavior" in Barcelona using real-world user feedback data exploring and describing interesting research questions.

BACKGROUND

Tourism is a phenomenon that reaches social, cultural and economic spheres focused on the movement of people from their usual locations to other places, motivated by personal or professional purposes, such a broad field of study is also a great opportunity to improve the services of Startups (e.g. Travel & tourism Barcelona Startups such as Grandtourgo (2018) or Authenticitys (2018) and of companies specializing in internet-related services and products in the hotel, lodging and meta search fields (e.g. Trivago); and also develop new business opportunities as well as technological evolution. And despite being an unpredictable branch of the economy due to factors such as political instability and natural disasters, Tourism continues to be a growing sector in Global economy with a GDP growth of 4.6%, surpassing the growth of global economy (3.0%), while generating over 8.2 trillion dollars and 313 million jobs in 2017 (Statista, 2018a). Tourism in the European Union (EU) is the third largest socio-economic activity and the world leader in tourism destinations, making an important contribution to the EU's gross national product and employment (Statista, 2018b).

These figures point out the need to have better information systems for stakeholders or common users. Buhalis (2003) pointed out the necessity of better integrated systems of information and communication to develop the tourism sector and evolving it within businesses and organizations, 15 years later with the advent of big data and real time data, information in the tourism sector is no longer just a necessity, it's the driving force behind its strong growth.

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