



Twitter sentiment analysis: Capturing sentiment from integrated resort tweets



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1. Introduction

With the rapid development of information and communication technologies, social networking sites and blogs have become an enormous repository for rich user generated content (UGC) (Thelwall et al., 2011). Information system scholars observed that business intelligence has evolved from analysis of traditionally structured business transaction data to studying unstructured and real-time data, driven by the development of online search engines, e-commerce, and social media (Chen et al., 2012). Among the existing collection of social media platforms, the Twitter microblog is one of the most popular mediums that have been adopted by both consumers and companies. Over half a billion Twitter messages (tweets) per day are being recorded (Kirilenko and Stephenkova, 2014; Krikorian, 2013), and a recent customer engagement technology study reported that Twitter is among the top three most used social media platforms by US hotel and restaurant operators (Kim and Connolly, 2013).

The prevalence of Twitter and its prodigious amount of UGC creates important implications for the hospitality and tourism sector. Research has shown that online UGC has become an important information source that exerts critical influence on customers' brand perception, brand reputation, purchase decision making, and profitability (Browning et al., 2013; Leung et al., 2013; Vermeulen and Seegers, 2009; Ye et al., 2009, 2011; Zhang et al., 2010). Twitter may be particularly susceptible to the effects of electronic words of mouth (EWOM) due to its viral nature. According to Kwak et al.

(2010) study, a tweet, if resent by a different user (retweeted), is expected to reach an average of 1000 registered users. In three years following Kwak et al.'s study, the total volume of daily tweets has grown over ten-fold (Krikorian, 2013; Weil, 2010).

While the viral influence of Twitter messages makes it valuable for firms to monitor and identify customer comments, the massive volume and high variance of real-time tweets has made that task extremely time consuming, costly, and often manually impossible (Chiu et al., 2015; Claster et al., 2013). Even though firms have started to embrace Twitter as a marketing platform, because of these obstacles, they often fail to extract much objective quantitative feedback or establish competitive benchmarks (i.e. comparing firm performance in social media against competitor performance) from this available data.

Sentiment analysis, which is still a rather nascent arena, appears to be a promising tool in solving the above mentioned problem. This technique involves using algorithms to automatically extract and classify text data into sentiment categories: positive, negative and/or neutral (Chiu et al., 2015; Pang and Lee, 2008). As compared to more traditional market research methods (e.g. surveys or opinion polls), sentiment analysis not only has the advantage of being more cost and time efficient in many cases, it is a non-intrusive method to extract consumers' opinions and sentiments in "real-time"—avoiding recall biases generally associated with post-consumption self-report measurements (Rylander et al., 1995). Furthermore, sentiment analysis can provide a temporal sentiment profile even on a second by second scale, which is not generally possible for survey based market analysis to achieve.

In this study, we demonstrate the application of sentiment analysis using Twitter data to build low-cost and real-time measures of hospitality customer attitudes/perceptions. Using a popular tourism destination (Las Vegas, NV) as a case study, we create a sentiment index for every Twitter account belonging to an

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integrated-resort property in the Las Vegas metropolitan area. The ensuing sentiment metrics are then used to benchmark these firms against one another, and compare their performance over time. The metrics are also cross checked with external hotel-casino rankings (i.e. TripAdvisor) to establish external validity. Discussion of the usefulness of this business intelligence tool is provided, along with potential limitations.

2. Literature review

2.1. Twitter and its applications

Since its inception in 2006, Twitter has become one of the most influential microblogging platforms on the Internet (Akehurst, 2009; Thelwall et al., 2011). According to a recent article on Huffington Post, Twitter officially reported a total number of 218.3 million “monthly active users,” or accounts in its 2013 October filing with the Security and Exchange Commission (Grandoni, 2013). In the United States alone, Nielsen (2012) estimated that in 2012, the microblogging site had over 37 million users via personal computer access, and about another 65 million via mobile devices. In addition to its large user base, Twitter users show a high level of engagement. Nielsen (2012) included Twitter among the top-three sites in terms of users’ total time spent (with Facebook and Tumblr). A recent study conducted by the Pew Research Center also found that 46% of Twitter users tweet on a daily basis (Dugann and Smith, 2013).

With its large user base and high engagement, Twitter has increasingly been used by the hospitality and tourism industry for promotion, distribution, marketing management, communication, and market research (Leung et al., 2013). When studying the use of social media by the hotel industry in Hong Kong, Chan and Guillet (2011) found that Twitter and Facebook were the two most widely used social sites. The industry mainly used the sites to promote discounted products and services, answering guests’ inquiries, and handling complaints. To a lesser extent, the sites were also employed to engage guests and obtain business intelligence. Twitter is also a popular social medium used by national destination marketing organizations (DMOs) for marketing purpose. Examining the social media activities of eight top international tourism destinations, Hays et al. (2013) uncovered that the DMOs generally posted more frequently on Twitter than on Facebook. The researchers explained that Twitter structure was built for timely updates and massive information broadcast. Due to the constant updates on this platform, tweets by any given users can be rapidly buried. As a result, organizations need to constantly refresh its updates to remain visible.

In the area of market research, Twitter data tends to be utilized more than those from other social media platforms. This is in part because of Twitter’s more liberal data availability; Facebook messages are often not publicly accessible due to its stricter privacy settings, and other platforms generally have smaller user pools (Wang et al., 2013). The high utility of Twitter data for research can also be attributed to its “people as sensor” network structure. Twitter has a fundamentally open networking structure, which allows its users to choose who they want to follow without seeking permission (Weng et al., 2010). This open structure of Twitter has made it into a “global pipeline for real time information sharing and broadcasting” (Wang et al., 2011, p. 34). The interactions among Twitter users can be viewed as a large network of sensors that react to external and social events, thus making it particularly suitable for studying the public opinions of these events (Kirilenko and Stepchenkova, 2014).

Aside from its conceptualization as a sensor network, Twitter is conducive for market research due to the internal architecture

of the messages. As a microblogging site, Twitter allows its users to post messages of a maximum 140 characters in length. These compact messages, also called “tweets”, capture the primary meaning users want to express without much irrelevant content. The unique function of hashtags, “#”, enables users to highlight the key words in their messages or find other posts under certain key words. Tweets can be forwarded (or “retweeted”) into a social network of friends and contacts by the use of “RT<@username>” or via “<@username>”. The “@” symbol is used to identify tweets which are addressed to a particular registered user (Cha et al., 2010). The condensed structure of tweets and Twitter’s unique functions make its data a useful fit for content analysis and sentiment analysis, which involves systematic reduction of content flow for the purpose of quantitative analysis (Kirilenko and Stepchenkova, 2014).

Twitter has the advantage of capturing a rich amount of authentic customers’ in-the-moment experience and sentiment (Capriello et al., 2011; Dodds et al., 2011). As compared to traditional research methods, such as surveys and comment cards, Twitter is a non-intrusive research model that suffers less from bias associated with recall and interactions with human subjects (Kirilenko and Stepchenkova, 2014). Asur and Huberman (2010) note that the collective wisdom on Twitter, if analyzed properly in a large enough volume, can be more accurate than other techniques in extracting information, such as surveys and opinion polls. Of course, Twitter data has limitations. For example, Twitter users are not representative of the general population, and Twitter posters are not necessarily representative of the entire Twitter user base—Twitter Inc. noted that 40% of users do not post any content. Boyd and Crawford (2012) caution that researchers should understand, and publicly account for, the limits of Twitter data set analyses.

2.2. Electronic word of mouth and its impacts

The attention social media receive from hospitality and tourism practitioners not only can be attributed to its value for business intelligence, but also to its powerful ability to spread word of mouth (WOM) immediately on a large scale (Leung et al., 2013). WOM is defined as informal communications among consumers concerning a product, service or an organization, and it is distinguished from those communications in which companies pass product knowledge to consumers through massive media (Litvin et al., 2008). Research has long recognized WOM as a trustworthy information source independent from commercial influences perceived by consumers (Leung et al., 2013). Traditional WOM and EWOM share a lot of similarity. However, the latter has the ability to reach beyond one’s immediate social circle and transcend the ephemeral nature of offline WOM (Litvin et al., 2008). EWOM, often in the form of online reviews and comments, can be easily archived, linked, and searched. EWOM is increasingly important in shaping consumers’ product knowledge and perceptions (Litvin et al., 2008).

A thorough literature review on hospitality and tourism EMOW-online review was conducted by Schuckert et al. (2015). Examining 50 relevant articles between 2004 and 2013, the researchers summarized five thematic clusters within the literature: the effect of online review on consumers’ buying, online response management and consumer satisfaction, reviewer’s motivation, sentiment analysis, and critical attributes of online review. The researchers noted more attention paid to the first two consumer-centric topics and more studies (60%) done in the hotel setting. EWOM is also naturally integral with the social media literatures. After a comprehensive review on social media in tourism and hospitality, Leung et al. (2013) pointed out that EWOM serves as a critical source for consumer’s pre-trip travel planning, and can be generated throughout their trip and post-trip phase.

As such, prior hospitality and tourism EWOM research can also be classified in two perspectives, listeners’ and originators’ (Litvin

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