Social Media Use for Large Event Management

The Application of Social Media Analytic Tools for the Super Bowl XLVI

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***Abstract*— Using social media analytics tools, Radian6 and Visible Technologies, Purdue Homeland Security Institute (PHSI) researchers were able to monitor, capture and analyze publicly posted online information pertaining to the Super Bowl XLVI. The study collected and analyzed data regarding the public's perceptions of the Super Bowl XLVI marketing campaign, as well as Indianapolis' hospitality, accommodations, and safety. Data was collected from three different platforms: Facebook, Twitter, and blogs. The results of the study provided insights into public sentiment, public dialogue regarding specific citywide events, and trending social media topics associated with each topic's keyword analysis. In our research we further explored the potential usage and application of social media analytics tools within local government and found that social media analytics can be of great value for the government in both special events and routine activities. Major applications of social media analytics as well as research questions and issues worth exploring in the future, including improving information flow and analytics for routine operations, are discussed.**

Keywords- Social media; emergency management; social media analytics; large events

I. INTRODUCTION

The use of social media today is ever growing and has become an inevitable part of modern society. People of different ethnicity, age, and gender use and interact with social media one way or another. According to the Internet world statistics, Internet usage had grown by 528.1% between 2000 and 2011[1]. Due to its overwhelming popularity among the public today, social media has been used in various industrial fields. One of the areas where social media has proven to be most effective is marketing, because it helps advertisers reach a large audience efficiently. Furthermore, many companies nowadays have implemented the use of social networking sites to maintain the creation of brand communities [2]. In 2007, Warner brothers created a Facebook profile for the movie "Fred Claus", where visiting users could watch trailers of the movie, play games, and download images [3]. There are currently more than 42 million active Facebook pages established for organizations and public individuals [4], because information posted on social media is often public, it becomes possible to monitor and analyze public opinion about a company, product, or topic. This development has led companies to utilize social media monitoring services so that they could keep track of what was being said online about their products and services. A study done by Syed-Ahmad and Murphy in 2010 illustrated the impact of GW, an Australian business, using MySpace, a social networking site, as a marketing tool [5].

Social media monitoring and analytics tools have been used successfully in the business sector for marketing purposes. However, the use of these tools for local governments and for the management of public events is not as well developed. The purpose of this paper is to present a case study of using social media analytics for monitoring a large event, and to derive lessons and applications for the use of social media monitoring in large event management. Researchers at the Purdue Homeland Security Institute (PHSI) analyzed specific social media data centered around one of the biggest annual events held the United States, the Super Bowl. By keying in on social media data in specific areas of interest for event planners and operators, researchers were able to provide them with near-real time information that enabled them to make appropriate adjustments that improved public comfort and safety, and influenced public perceptions of host-city hospitality, event organization, and security.

II. BACKGROUND

The following section provides a brief overview of past literature concerning social media, social media analytics, and these technologies' applications to emergency management.

A. Social Media Analytics

In order to gain a better understanding of how social media is used in large events, we need to start by defining social media. Social media is a "group of internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content" [3]. Social networking sites, SNS, are a part of social media and are defined as "web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system" [6].

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Due to social media's vast growth, new technologies were developed to monitor and measure social media content. This class of technologies is also known as Social Media Analytics, which "draws from Social Network Analysis, Machine Learning, Data Mining, Information Retrieval (IR), and Natural Language Processing (NLP)" [7]. Previous research has used social media analytics tools to gather and analyze social media content. For instance, social media analytics were used to monitor and gather data pertaining to the Japanese tsunami crisis that occurred in March of 2011 to study the effect of using social media in emergency preparedness before, during, and after the crisis [8]. Social media analytics tools were also used to study the effect of social media on the pandemic influenza in 2009 [9]. However, not much literature was found regarding using social media for large event management.

B. *Social Media in Emergency Management*

Previous literature indicates that social media was adopted by the public in emergency events. During the 2007 Virginia Tech shootings, most of the students relied on text messaging and instant messaging on social media websites such as Facebook, to notify and check on the safety of their friends. After confirmation that 32 civilians were killed, people all over the world began following the Virginia Tech story using online social media tools. The collaboration of information online also allowed public users to identify the victims of this tragedy before official authorities made a public announcement [10].

When the Southern California fires broke out in 2007, people in the affected regions used social media to develop better situational awareness of what was happening. Research showed that those affected by the fires found that traditional media and the official communications were not instantaneously updated, nor specific to their area. These problems are generally overcome when information is shared using social media tools [10].

According to Merchant, Elmer, and Lurie, integrating social networking sites into preparedness activities for emergencies can help build community resilience, making it easier for both professional responders as well as the public to use these social media tools in an emergency [11]. A study done by Hughes and Palen provided statistical evidence that Twitter was used in emergency situations to share information regarding the given event [12]. In their study they gathered tweets regarding four different events that took place in the United States, including Hurricane Ike and the Republican National Convention. The study done by Palen and Hughes, provided insights about the use of Twitter in emergencies by studying the users' daily activities, number of tweets, and Twitter adoption among new users [12].

Social networking sites can contribute greatly in raising awareness regarding emergency events. A study done by Viewing and colleagues provided evidence that Twitter helped raise situational awareness regarding emergency events by analyzing Twitter communication pertaining to two emergencies that took place in the United States: the Oklahoma fires and the Red River floods. In their study they gathered tweets and examined them with respect to geographical locations, shedding light on how Twitter messages are used across different disasters [13].

The studies reviewed here show that the public uses social media to disseminate and obtain information during emergency events. Moreover, since social media are often deemed to be more effective than official communications using traditional media, it is important for emergency management personnel to consider adopting social media and using it for public communication.

Most of the previous research about social media use in emergency management collected event data post-hoc, and most of this research applied to disaster situations. The present research contributes to existing literature by reporting data that was collected and analyzed in real time, as the event was unfolding, and by looking at social media use during a large public event, as opposed to a natural disaster. In the remainder of the paper, we explain how we used social media analytics for real-time event monitoring and discuss applications for large event management.

III. METHODOLOGY

A. *Data Collection*

Radian6 and Visible Intelligence are social media analytics platforms used by large companies such as Pepsi, FedEx, Dell, Coca Cola, Walgreens, and many others. Both platforms are designed to collect social media content from several popular social media sites. Data was gathered daily using identical keywords in both platforms between January 2nd, 2012 and February 7th, 2012, which provided about 36 days of data. Out of the 36 days, 34 days were pre-game day and 2 days were post-game. In order to gather the proper types of social media content, search keywords were adjusted to ensure that the data collected was related to the Super Bowl XLVI specifically. The keywords used for the purposes of this study are Indy, Indianapolis, super bowl, super bowl, XLVI, 2012, AND #sb46.

The same keywords were used throughout the entire study period. Furthermore, it was necessary in some instances to exclude certain keywords that could affect the collected data. For example, when data was being collected for the last report (the AAR), one tweet was *retweeted* by thousands of people about an individual who had cancer and made it to the game, which affected the results. Thus, to ensure accurate data collection the keyword "@markherzlich" was excluded from the last report.

B. *Procedure*

Using special software features, data was analyzed based on sentiment using the following categories: neutral, positive, negative, and mixed. Moreover, data was analyzed by media type (Twitter, Facebook, blogs), to monitor where most of the chatter was coming from. Other software features analyzed the differentiating terms of the search (positive keywords vs. negative keywords), the most frequently used keywords, and the content of the social media chatter about the Super Bowl XLVI.

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Both social media analytics platforms provide graphical representation of the data collected by using charts and color coordination (e.g. negative keywords colored red and positive keywords colored green).

IV. RESULTS

We present here the main findings regarding the public's overall perception of the Super Bowl and the city of Indianapolis' organization and hosting of the event. The results are based on the entire body of data collected, since it is not feasible to present results for each of the 36 days we monitored. Daily reports were provided to local government that enabled quick action to improve the public's experience of this event and the hosting city.

The examination of results from the two social media analytics platforms lead to the identification of three major findings: Online chatter before game day was not mainly about the Super Bowl but rather about issues that were going on in Indianapolis (e.g. the right-to-work bill); Public opinion about the city of Indianapolis hosting Super Bowl XLVI was overwhelmingly positive; Social media chatter increased each week as game day got closer.

A. Theme 1: Chatter before game day was not entirely around theSuper Bowl

The Super Bowl is a big event that is watched by millions of people around the world. An estimated 1.1 million guests attended the Super Bowl XLVI festivities that took place in Indianapolis in January and February of 2012 [14]. Having access to social media monitoring tools, Radian6 and Visible Intelligence, enabled researchers to gather data before, during, and after the game. Doing so provided a complete view of the trends and themes present in public social media posts.. Special software features enabled researchers to analyze data based on a specific timeframe, content sentiment, and overall social media activity. "Fig. 1*"* is a social media activity and sentiment graph from the timeframe January 12th, 2012 – January 19th, 2012. The total number of posts for the monitored week was 3,397. The green, red, and yellow lines indicate the number of posts marked by the software as positive, negative, and mixed sentiment. "Fig. 1" shows an abrupt increase in number of posts on January 17th and January 18th of 2012. The number of social media content reached a total of 1,167 posts those days.

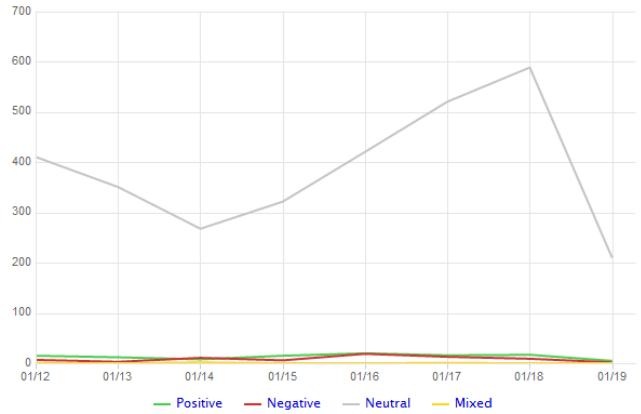

Figure 1. Social Media Activity Chart

Analysis showed that the peaks in "Fig. 1" were caused by chatter that was not directly about Super Bowl XLVI, but rather about issues that were happening in the city of Indianapolis. "Fig. 2" shows the most prominent keywords, the negative and the positive terms, used across Facebook, Twitter and blogs on January 17th and 18th of 2012.

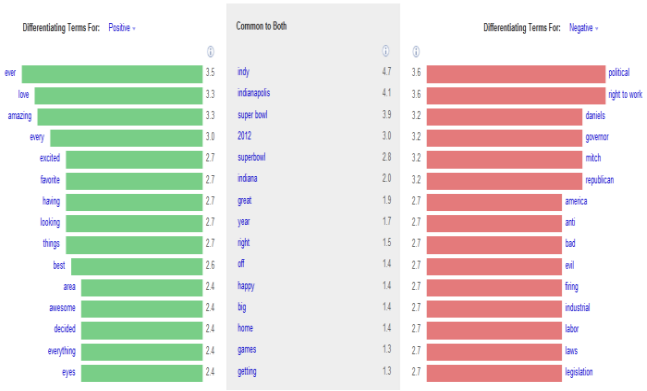

Figure 2. Most Prominent Keywords (January 17th- 18th)

A great deal of the social media posts from January 17th and 18th, 2012 were concerned with the issue of right-to-work and politics. Most of the chatter about the issue was negative; "Fig. 2" outlines the most frequently used keywords by the public and their sentiment. "Fig. 3" is a content sample of the chatter concerning the city's governor. While content about labor, the governor, and the issue of right-to-work was mainly negative, chatter about the city of Indianapolis was mainly positive. People used terms such as "amazing" and "awesome" when talking about the city of Indianapolis hosting the Super Bowl XLVI and the preparation efforts.

Figure 3. Content Sample

B. *Theme 2: The public's opinion about Indianapolis was overwhelmingly positive*

Most of the chatter about the city of Indianapolis was tremendously positive. "Fig. 4", "Fig. 5" and "Fig. 6" show the percentage of positive, negative, mixed, and somewhat positive posts within each social media platform (Twitter, Facebook, and blogs). Overall, 86% of the data collected from Twitter had positive sentiment, with only 14% negative sentiment. In addition, 88% of the data collected from Facebook had positive sentiment, with only 10.5% negative posts. Finally, 78% of the blog posts had positive sentiment, with around 16.3% negative posts.

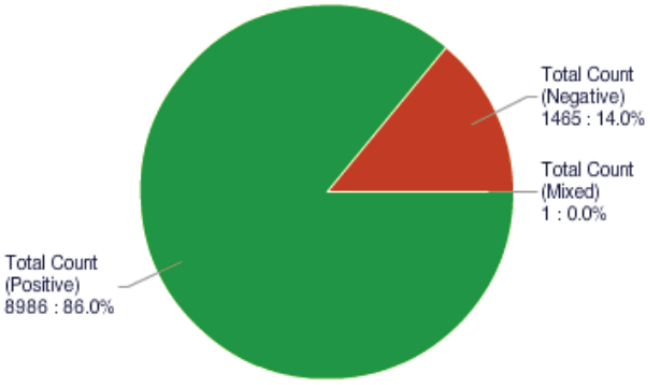

Figure 4. Twitter: Positive versus Negative Sentiment

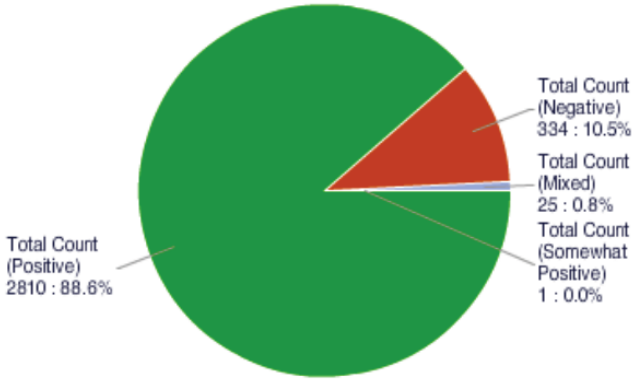

Figure 5. Facebook: Positive versus Negative Sentiment

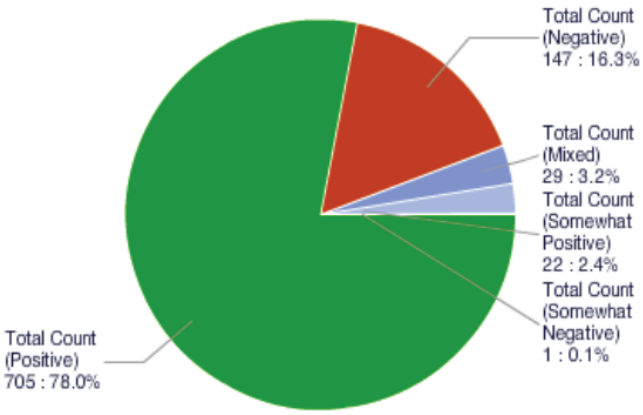

Figure 6. Blogs: Positive versus Negative Sentiment

Using the social media analytics tool features, sample content was generated with positive sentiment. "Fig. 7" shows some of these samples. Overall, most of the chatter about Indianapolis and the Super Bowl Village was positive and the public enjoyed the city and the efforts that were put into preparing Indianapolis for the big game.

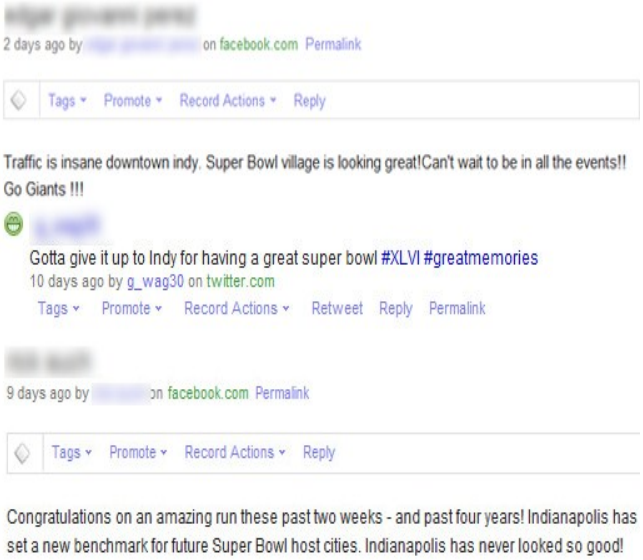

Figure 7. Content Sample

C. *Theme 3: Chatter increased every week as game day approached*

As the big game day came closer, chatter about the Super Bowl XLVI increased. "Fig. 8", "Fig. 9", and "Fig. 10" are line charts from the 3 weeks pre-game day. The total number of posts in "Fig. 7" was 2886 posts during the time frame January 5th, 2012 – January 12th, 2012. The number of posts

increased to 3397 posts during the following week January 12th, 2012 – January 19th, 2012, shown in "Fig. 8". Finally, the number of posts almost doubled reaching 6693 posts during the time frame January 19th, 2012 – January 26th, 2012, as shown in "Fig. 9".

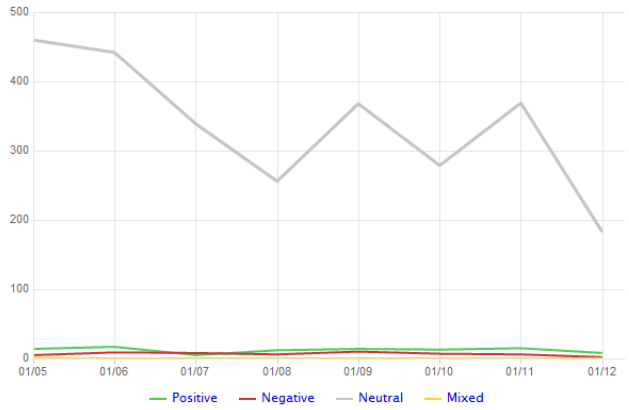

Figure 8. Social Media Activity (January 5th – January 12th)

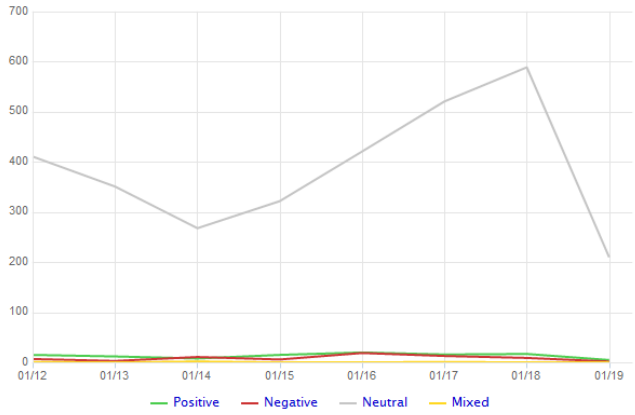

Figure 9. Social Media Activity (January 12th – January 19th)

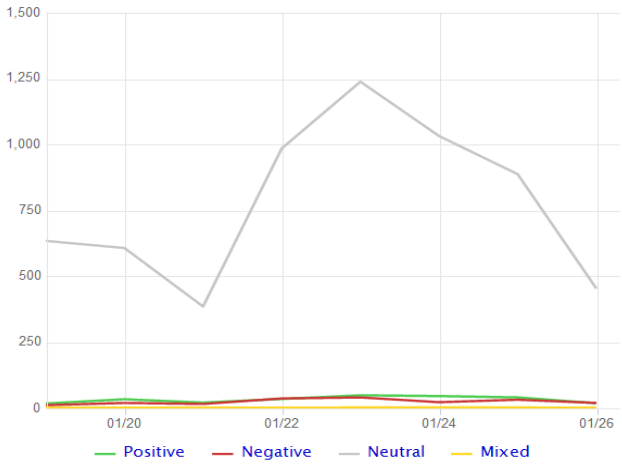

Figure 10. Social Media Activity (January 20th – January 26th)

V. Discussion and Future Research

Even though social media monitoring tools are mainly used by businesses for market research and marketing purposes, this study demonstrates the possibility to employ social media analytics for large event management. This particular study explored the potential use of social media analytics for local government, and found that such tools could be used for special events but also routine activities. Providing near real-time insights into public opinion can help steer external and internal government response and policies. We identify the following major applications of social media analytics for local government:

Social media analytics could be used proactively to identify topics and issues discussed by the public and respond to them swiftly. For example, social media chatter can provide immediate information about crowd control issues, which the local government can respond to in order to maintain safety.

Furthermore, social media can be used to inform routine operations. The use of such tools could help with the early identification of routine operational issues under the State's jurisdiction. For example, during the Super Bowl XLVI complaints about a street curb that was tripping visitors were found online and were responded to promptly. Social media analytics tools can replace and prevent the accumulation of complaints on hotlines and other feedback mechanisms.

As this study shows, social media chatter provides a detailed view of public opinion. Collecting this amount of data through surveys and interviews could be prohibitively expensive and would require monumental effort. Social media analytics not only provide access to raw data, but also to instant analyses that can act as quick evaluations of event success. Social media analytics can facilitate the evaluation of special events as well as routine operations. The relative volume of positive and negative chatter or the absence of negative chatter can provide quick indicators about public perception. Therefore, social media analytics could be useful evaluative tools.

This study provided an exploration of the potential of social media analytics tools for local government and specifically for large event management. Overall, social media analytics are capable of helping local governments become more responsive to public needs and facilitate early identification of issues.

Future studies can focus on establishing procedures for identifying issues very early, in order to respond to them faster or even anticipate them before they occur. For example, event organizers could publicize event schedules well in advance and propose an associated Twitter *hashtag* for each activity, concert, exhibit, etc., in order to enable targeted keyword searching for each part of a large event. Moreover, further research can assist local governments in putting in place ongoing social media analytics programs that will monitor routine and seasonal issues such as satisfaction with state agencies, roads, road construction, traffic, use of fireworks around holidays, etc.

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