

Understanding Public Emotional Reactions on Twitter

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Abstract

Social media has become an important communication medium for people to express their feelings and opinions, sometimes on a daily basis. We demonstrate a system that helps monitor and understand how people feel about specific topics or events. Using a large vocabulary of emotion words constructed from a number of public domain resources and mapping them to an emotion hierarchy, our system is able to analyse incoming posts gathered on a topic of interest and visualise the emotional pulse of a geographical region as it reacts to that event. The content analysis component of the tool then enables users to gain insights into the mood variations exhibited. We illustrate the system by exploring the public reaction to a specific recent event: the Sydney siege tragedy on December 15th, 2014.

Introduction

Organisations are increasingly turning to publicly available social media data to gain valuable insights about their products or services. As such, social media monitoring is a growing application area that sees the combination of text analytics and social computing tools. One often requested feature is automated sentiment analysis, to provide insights about public reactions. However, sentiment analysis, particularly for open-domain social media content, is still an open research question.

Noting the difficulties of presenting sentiment analyses for this purpose, we observe that an emotion-based analysis on open-domain Twitter content, as presented in the “We Feel” system¹ (Milne et al., 2015), has been demonstrated as having some correlation to mental health indices (Larsen et al., 2015). However, this work also shows surprising results, which we could not explore further with the We Feel System as it only presents aggregated data.

In this paper, we introduce “VizieFeel”, a novel combination of emotion analysis and social media monitoring

where a clear topic of interest can be defined. Generally, this is the name of a product, service, organisation, campaign or event. We illustrate it with the insights it enabled us to gain when monitoring the public reactions to the Sydney siege tragedy in 2014.

Specifically, we explore the use of text analytics, as in (Wan and Paris, 2014), coupled with an emotion-based visualisation to provide an interface to explore and gain insights from a collection of social media data. With respect to the current case study, the interface can support mental health researchers or social scientists gain insights into emotional reactions, as expressed on Twitter, to specific events and facilitate mental health research.

A Brief Description of the System

VizieFeel collects social media data based on queries designed to capture data for specific topics or events. The system can collect content from a number of social media platforms. However, in this paper, we only discuss our analysis of Twitter data.

Each collected tweet is analysed using the method described in (Milne et al., 2015) which aggregates statistics about the occurrences of different emotions, indexed by time and geographical regions. VizieFeel keeps track of the tweet identifiers (provided by Twitter) to allow users to select tweets with a time frame, geographical region, and an emotion category of interest. It then presents content-based insights on the selected tweet collection.

A case study: the Sydney Siege, Dec. 15th, 2014

On the morning of Dec 15th 2014, a gunman held a Sydney café under siege. In the early hours of Dec 16th, the siege ended with the deaths of two hostages and the gunman. The event captured the public attention in Australia and dominated the week’s news cycle. In Fig 1, we show the visualisation of emotional content for *all* tweets (i.e., not limited to the siege) in the Oceania region (including

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¹ <http://wefeel.csiro.au>

Australian and New Zealand), as shown in We Feel.

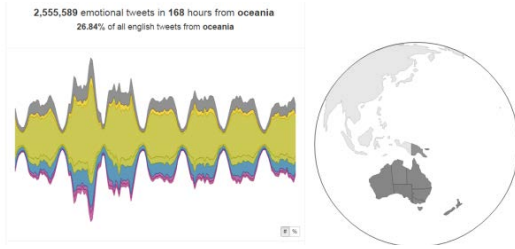


Figure 1. Emotional Tweet volume in Oceania from Dec 14-21, 2014. The yellow band represents the emotion “joy”.

To our surprise, while there was a surge in emotions such as sadness as expected (see Fig 2), there was also a surge in joy (shown in yellow in Fig 1).

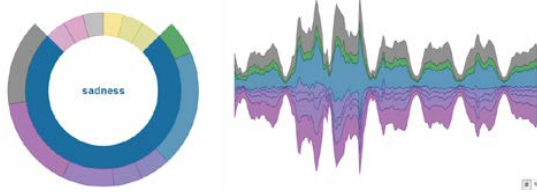


Figure 2: Sadness around the Sydney Siege

To investigate the context behind these emotional responses, we used VizieFeel to apply the emotional analysis specifically to content focused on the siege. In Table 1, we list some of the query terms employed. Queries are case insensitive and double quotation marks are used to enforce phrasal matches. Initially, the gunman was associated with ISIS, although it was later revealed he was an independent individual, potentially with psychological issues.

#illridewithyou ²	"martin place"	Lindt ISIS
#breaking	#martinplacesiege	#martinplace
#seige	#sydneyseige	#sydney
lindtcafeaus	sydney cbd	sydney gunman
sydney hostage	sydney isis	Lindt

Table 1. Queries for the Sydney Seige event.

Using these queries, we collected from Dec 15th to 22nd approximately 133,000 tweets registered in any Australian time zone (tweets were collected worldwide; however we focus here on the Australian public reaction). Table 2 presents descriptive statistics for the collected data, together with the results of the emotion analysis.

Upon inspection, 54% of the tweets on Dec 15th were associated with joy, which was puzzling. We looked at the results of the content analysis provided by the system to understand what was happening. As shown in Table 3, we found messages of hope, praises for the police, prayers and unity from a wide spectrum of the community. This is also illustrated in the top hashtags and keywords (see Table 4). As the events unfolded in the early hours of Dec 16th (with

² From Dec 16th onwards.

the death of two of the hostages and the gunman), however, the proportion of happiness tweets decreases dramatically, and sadness increases.

	Total Tweets	Emotive Tweets.	Joy	Sadness
Dec.15	32,325	2980 (9%)	1622/2988 (54%)	409/2988 (13%)
Dec.16	22,973	2695 (11%)	1161/2695 (43%)	856/2695 (31%)
Dec.17 -22	77,334	12336 (15%)	6276/12336 (50%)	2348/12336 (19%)

Table 2. Descriptive statistics of the data captured.

Top retweeted items in Joy category (duplicates removed)
This, this is what good people do. #sydneyseige #MartinPlace http://t.co/zxbHLWzxEp 2014-12-15 15:01:53 [freq:93]
Massive respect to @nswpolice today. Their professionalism and calmness under such circumstances is amazing. #sydneyseige 2014-12-15 17:11:36 [freq:13]

Table 3. Top retweeted items of “Joy”, duplicates removed.

Top Hashtags: frequency	Top Keywords: frequency
1. #PrayforSydney : 21	1. good : 112
2. #9news : 16	2. grand : 77
3. #siege : 16	3. stay : 45
4. #nowletourmatesgo : 11	4. safe : 40
5. #SydneyHostageCrisis : 9	5. peaceful : 32

Table 4. Top 5 hashtags & keywords of “Joy”, queries excluded.

Conclusions

Coupling emotional analysis with content analysis tools and the ability to drill down can help us understand not only emotional reactions expressed on social media but also why the emotion reactions occur as they do.

Acknowledgement

We thank Brian James for his work on the VizieFeel interface.

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