

# The Rise & Fall of #NoBackDoor on Twitter: the Apple vs. FBI Case

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**Abstract**—In addition to using social media to connect with others worldwide, many people nowadays get their news about different national or international events such as natural disasters, crises, political elections, conflicts etc. via social media. This evolution in the usage of social media has not only led to the generation of massive amounts of data but also various information consumption behaviors. In this study, we developed a framework that can be used to monitor/understand, analyze, and visualize in real time how people consume information and react to events. Following the case study of Apple, Inc. vs. FBI, we tracked the usage of the #NoBackDoor on Twitter in real time and were able to understand what people are thinking about the case and who are the actors involved in this network. The framework can be applied to study other events and provide a deeper understanding of how public sentiments evolve during an event, whether it is a crisis or major news event.

## I. INTRODUCTION

With the rapid advancement of technology, people are more connected than ever before. Internet and social media boosted the speed of information diffusion tremendously across the globe. People can know what is going on in the remotest parts of the world as soon as the event occurs with the help of the internet. Almost all the news agencies now have social media hub in addition to their main website, TV channel, and magazines/newspapers. People can read articles online and click the “Share” button which enables them to share it on different social media outlets such as Twitter, Facebook, Tumblr, Blogs, etc. This helps in speeding up the diffusion and consumption of information.

In this research, we study the behavior of individuals and the sentiment of the public with respect to the Apple vs. FBI case via social media. Here, we picked Twitter as our environment to explore how people are reacting to this case and how they feel about it. We collect, visualize, and report the activity of the people on social media with respect to the Apple vs. FBI case. In this case, FBI requested Apple<sup>1</sup> to help them crack the iPhones of the suspects in the San Bernardino terrorist attack. Apple rejected to do so and the FBI sued Apple for not cooperating. We looked for a seed knowledge that can be used to initiate the project so we chose the #NoBackDoor as

many people were using it to raise awareness of the issue/case and spread the news articles that were written about it. We propose and test a framework that gave very good results in answering the research questions we were interested in finding an answer for. The framework can be applied to other events in the future.

**Research questions:** The goal of this study is to create a framework that can be used to help understand how the public thinks about specific events online and monitor their sentiments. We were interested in finding answers to the following research questions:

- How do the majority of the people in the dataset we collected feel about this case? What kind of emotions do they express?
- Who are the powerful actors in this environment? Who are the top users over time?
- How does the sentiment change over time?
- How long the conversations last on this case? What was the life span of that hashtag?
- What is the activity that the people use the most (i.e., tweet, retweet, or reply) to raise awareness of that case?
- Were the messages written by analytical people (people who use words that suggest formal, logical, and hierarchical thinking patterns)?
- Were the messages focusing on the past, present, or future?

**Contributions:** In this paper, we make the following contributions:

- Developed a framework that can be used to monitor/understand, analyze, and visualize the information consumption behavior of users online and the public opinion about specific events such as news piece or crisis, etc.
- A good understanding of the public sentiment about the case was developed.
- Data set about the Apple vs. FBI case were continuously collected.

The rest of the article is organized as follows. Theoretical background of the research and other cases we studied before is discussed in Section II. Section III presents the

<sup>1</sup>Is Apple Right in Defying the F.B.I? *The NY Times*. 2016. Available at: <http://nyti.ms/1qGtynH>

research methodology including a description of the dataset and software used to collect the data, our proposed framework, and finally the results and analysis we obtained in this study. Section IV concludes the study with possible future research directions.

## II. LITERATURE REVIEW

Due to the real time information dissemination nature of Twitter, it gained a lot of attention recently [1]. Many studies have been conducted on Twitter data to monitor in real time different events such as detecting and monitoring earthquakes [1], crises [2], news media content [3], etc. In a research conducted by Takeshi et al., the authors developed an algorithm to detect earthquakes by monitoring Twitter tweets for a specific keywords. Then the authors used a classifier to detect the occurrence of earthquakes with a high probability [1]. Another research was done by David et al. where the authors introduced a service called the “Crisees” that aggregates and collects data from different social media websites during crises [2]. Lias et al. introduced “NOAM” which is an integrated platform to monitor and analyze news outlets [3].

We are different than all the aforementioned work, as all the work mentioned above mainly care about the location of the event and how to detect it, while we are not trying to locate nor detect events. Instead, we are more interested in monitoring, analyzing, and visualizing the information consumption behaviors of individuals, and evolution of the public sentiment during events, to have an idea of what people think and how do they react to specific event or news release. Furthermore, we develop a framework that consists of open source software. It is not an algorithm that uses a classifier to detect an event [1], or a service that collects geographic information from different social media websites [2], nor a platform to analyze news outlets [3].

It is crucial to understand what is being said or what the public think during an event. In this project, therefore, we develop a *framework* that can be used to understand how people react to specific events (such as news release, crises, etc.) that can be tracked using related keywords or a specific hashtag that is used during that event. We have followed a similar approach to study the information maneuvers and propaganda dissemination that were projected against two of the NATO military exercises namely Dragoon Ride Exercise in 2015 [4] [5] and the Trident Juncture Exercise, 2015 and also the dissemination of ISIL beheading videos on social media [6] [7], and during the Crimean water crises [5]. In this study we perform content analysis using Linguistic Inquiry and Word Count (LIWC) and Watson Analytics tools to have an understanding of the public sentiments, nature and type of conversations, and to further enhance the previous models we proposed.

## III. METHODOLOGY & FINDINGS

### A. Data Collection

We collected data using Twitter API for all the tweets posted between February 16 and March 30 of 2016 that contain

the hashtag #NoBackDoor. This resulted in 982 Text, which include: (388 tweets, 243 mentions, and 351 retweets) and 698 unique user accounts.

### B. Software used

We have used the following software to collect, analyze, and visualize the data.

- NodeXL (to collect and analyze the data. Available at: <http://bit.ly/1WKA5u9>),
- Google TAGs (for collecting data in a continuous manner and also to have a live visualization. Available at: <http://bit.ly/1KPrRH2>),
- Linguistic Inquiry and Word Count (LIWC) software (to calculate the sentiment. Available at: <http://bit.ly/1WKAYN3>), and
- IBM Watson Analytics (to explore the dataset and get further insights, such as the nature and type of conversations. Available at: <http://ibm.co/214CjoD>).

### C. Proposed Framework

We develop a framework that can be used to monitor and analyze the public reaction to a specific event, such as: crises, election, or propaganda dissemination. In this study we test the framework, and it reported promising findings as discussed in the next section. The framework is shown in figure 1, and it is explained below,

- 1) Start with seed knowledge that can be provided by domain experts. For this study we tracked the usage of the #NoBackDoor.
- 2) Collect data based on the usage of these hashtags/keywords using Google TAGS and visualize the data with TAGSExplorer.
- 3) Analyze the data using NodeXL to get more insights about powerful users, most replied to users, most mentioned user, other related top hashtags used, and domains used (Analysis of the communication network).
- 4) Track the usage of the hashtags/keywords and update the data as time passes.
- 5) Export these data and run LIWC on the text collected to calculate the sentiments.
- 6) Import this dataset to Watson Analytics to explore, analyze, and find answers to all the questions of interest.

### D. Results & Analysis

*Using NodeXL we were able to identify the following interesting findings:*

- The @fbi is not at the top list of Tweeters which means they are not tweeting that much about this topic, but the #FBI is ranked as the third hashtag in the list which means many people are using this hashtag in their conversation, and the @fbi is at the top list of retweeted users which means many people trying to share what FBI is saying on Twitter.
- Many people were mentioning @tim\_cook (the CEO of Apple Inc), @apple, and @realdonaldtrump in their

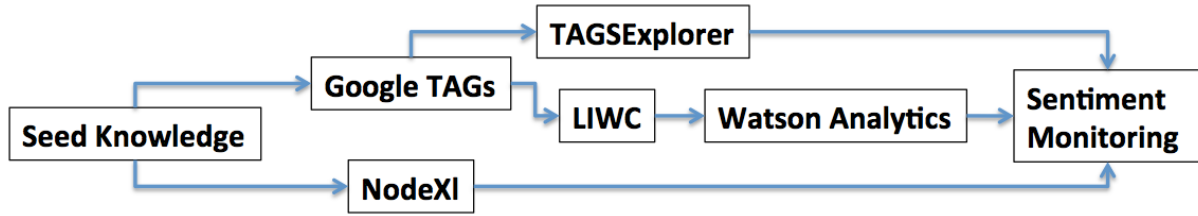


Fig. 1: Proposed framework to monitor public sentiments, type, and nature of conversations about events.

tweets when he called Apple’s claim to privacy “disgraceful”.

- The top 10 domains included in the tweets were either news websites or social media sites, these include: (apple.com, twitter.com, cnn.com, apple.news, goo.gl, huff.to, fb.me, reuters.com, wh.gov, nytimes.com). This show that many people were mainly sharing news articles written about the case on different social media sites.
- The top 10 Hashtags included in the tweets were: (#Nobackdoor, #apple, #savecrypto, #fbi, #doj, #privacy, #encryption, #applevsfbi, #iphone, #timcook). These are good to know if a counter message need to be pushed to the audience who follow these hashtags then the message should include these hashtags.
- The top 10 mentioned users in entire graph were: (@tim\_cook, @apple, @realdonaldtrump, @reneritchie, @boughb, @foxbusiness, @entrepreneur, @michael-hanekes, @macrumors, @philipshannon). These are the nodes who most of the tweets were direct to them i.e. the public wants to letting them know what they think in their tweets.
- The top 10 retweeted users in Entire Graph were: (@tim\_cook, @dennis\_kucinich, @brave, @k8em0, @apple, @fbi, @billmontei, @atlanta0101, @misterbisson, @paulamacdowell). These are the nodes who people were interested in sharing what they said e.g. a user agree or disagree with what one of these people said and want the rest of his/her network to know that s/he agree or disagree with what they said.
- The top 10 Tweeters in Entire Graph (users who tweeted a lot about the case) were: (@40billion, @startupsupastar, @ericsteelive, @nytimes, @la\_stampa, @lauschjack, @lionelmedia, @thegrugq, @washingtonpost, @usato-day). These represent the source of information in the network i.e. they are responsible for generating the majority of the tweets.

Using GoogleTAGs, TAGSExplorer, LIWC, and Watson Analytics we were able to find out the following:

- When the issue was publicized there were a lot of activity (tweets, retweets, and mentions), but then the amount of activity decreased as time passed.
- The dataset we obtained had more tweets (388) than retweets (351) and mentions (243), which is usually true if no bots were involved. This would be different if bots were involved e.g. the retweets count will be more than

the others.

- Retweets and mentions have more negative or positive sentiment than the tweets. This suggest that when people are retweeting or mentioning other users they are adding a word or two that increase the negative or positive sentiment score.
- The numbers of posts with positive emotion were more than the number of posts with negative emotion over time, which means people were more positive emotionally, about the case, than negative.
- The negative emotions had more *anger* and *anxiety* than *sadness* over time. This is clearly shown in figure 2 (a). This suggests that people were more angry about the case than anxious or sad.
- The text we collected have a higher *Clout Score* : “refers to the relative social status, confidence, or leadership that people display through their writing or talking” [8] compared to other dimensions such as *Authentic*: “When people reveal themselves in an authentic or honest way, they are more personal, humble, and vulnerable.” [8] and *Analytic*: “A high score is associated with analytical, formal, and logical thinking. A low score is often associated with more narrative thinking where the speaker is in the here-and-now.” [9] [8] over time suggesting that the users who wrote those tweets have high confidence, or leadership skills which can be displayed through their writing or talking. This is depicted in figure 2 (b).
- The majority of the people in the dataset we collected were focusing on the present tense instead of focusing on the past tense or future tense. Past tense and future tense focus had almost identical trends over time. This means that the majority of people tend to be “psychologically close” i.e. “tend to be more neurotic, depressed, and pessimistic than either past-oriented or future-oriented people” [10]. This is depicted in figure 2 (c).
- We were able to identify who are the top 10 powerful users (“people use words such as command, boss, and defeat.” [9]) or the users who have powerful messages. This gives an idea on the nature of the words that has been used in the tweets.

#### IV. CONCLUSION & FUTURE WORK

In conclusion, we studied/examined the case of Apple, Inc. vs. FBI as an example of news monitoring, which created a buzz in social media for a while. The case had a lot of

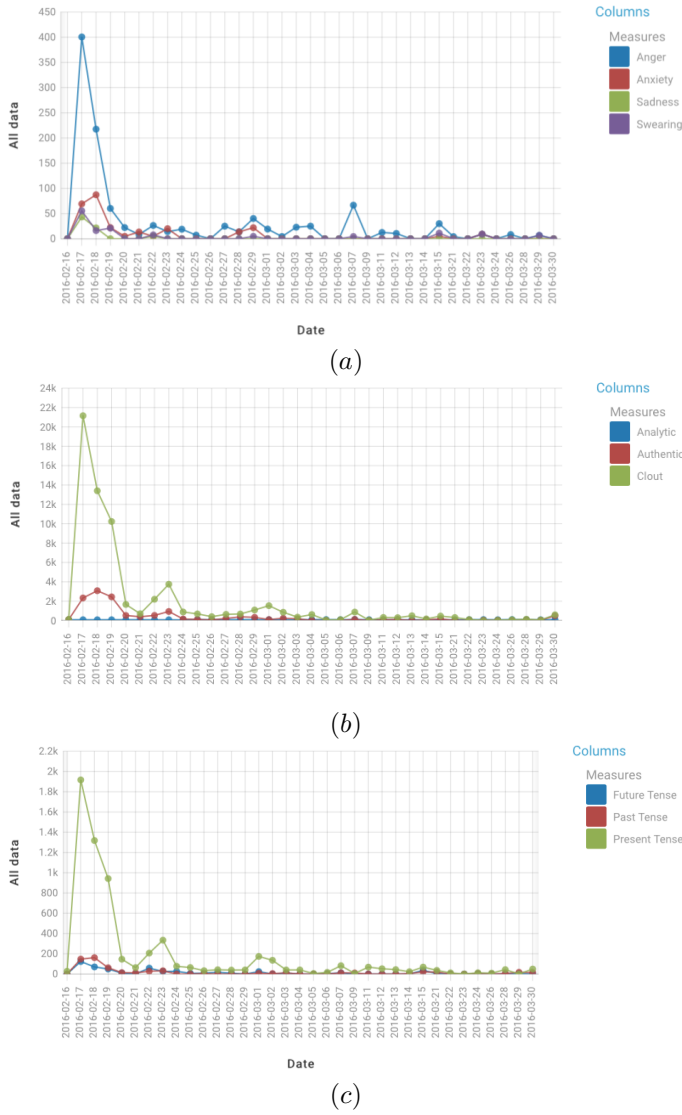


Fig. 2: (a) Negative emotions subcategories, where “Anger” was the highest while “Anxiety”, “Sadness”, and “Swearing” were lower, (b) “Clout” was highest among “Authenticity” and “Analytics”, (c) People focusing more on the “Present” than the “Past” or “Future”.

controversy whether Apple, Inc. should cooperate with the government and unlock the devices or not. We developed a framework that can be used to monitor/understand, analyze, and visualize the information consumption behaviors of individuals, and the sentiments of the public during events such as news release, crisis, or dissemination of propaganda. We have extended our methodology by conducting content analysis using LIWC and Watson Analytics tools to understand the sentiments, nature, and type of conversations. We were able to answer the questions of interest. We were able to see the reaction of people to Mr. Donald J. Trump as he talked about Apple’s claim to privacy, how people were more positive than

negative about the case, and were angry more than sad among other findings discussed above. We have learned that such a system is required and specially helpful for authorities to understand what people think and make sure no propaganda is being pushed to influence mass thinking. One limitation of this research is the amount of data collected by Twitter API does not represent all the public data available. In future, we plan to apply this framework on other events and create a system where all these software can communicate with each other in automatic fashion to reduce the human intervention.

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