


Detection and Prevention of Twitter Users with Suicidal Self-Harm Behavior

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ABSTRACT

Recently, with the development of communication means such as 4G and the rapid growth of the use of mobile devices (smartphones and tablets) the number of twitter users has increased exponentially. By the end of 2018 Twitter had 321 million active users with over 600 million tweets every day. However, all this information will have no use if we cannot access the meaning it carries. The authors' idea is to identify Twitter users with suicidal or self-harm behaviors by analyzing their tweets using an algorithm inspired from the social life of Asian elephants. The objective is to prevent the situations of depressions, threats of suicide or any other form of self-destructive behavior that exists on Twitter.

KEYWORDS

Asian Elephants, Datamining, Depressive Person, Self-Harm, Sentiment Analysis, Social Network, Suicidal Behavior, Twitter

INTRODUCTION AND PROBLEMATIC

Twitter strives to provide an environment where users can feel free to express themselves. People's anxiety is reported to have increased 70% since the advent of the internet, according to a study published in 2018 by UK-based Royal Society of Public Health (Araque, 2019). Social networks are a vector of anxiety, sleep problems and depression. Twitter receives in this study, the palm of the worst network for morale.

In 2017, an event prompted them to react: an 18-year-old man posted a tweet explaining his desire to end life on twitter, it was April 24, 2017. The next day, he put an end to his days. A shock for users and a bad buzz for twitter. Since 2017, social networks have been working with suicide prevention associations around the world to provide support to persons in distress (Alaei, 2019).

It is difficult to interpret online publications. Even so, there are some warning signs that can help us to identify people who are suicidal or have a risk of self-harm such as:

- Does this person show a sense of depression or hopelessness in his publications?
- Does this person publish morbid comments? Does she evoke death unequivocally?
- Does this person post comments about past suicide attempts?
- Does this person describe or publish photos of self-harm?

In this context our goal is to develop a new system to detect depressive persons with self-harm or self-suicidal behavior using an algorithm inspired from the social life of Asian elephants. This system aims to analyze the feelings of twitter users based on the interpretation of their publications to prevent situations of depression by signaling a self-destructive post.

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The general structure of this paper will be as follows: we start with a state of the art for presenting the essential works in this topic, after we go on with a section detailing our approach and proposed components then an experimental and comparative study will be carried out for presenting the best results obtained. Finally, we will finish with a conclusion and describing some lines of thought that remain open and that we want to share them with you.

LITERATURE REVIEW (RELATED WORK)

Our people detection problem with self-harm or suicidal behavior is registered in sentiment analysis field. In what follows we will mention the different works to realize in this context:

The work of Mohammad et al In (Mohammad, 2013) have described two state-of-the-art of SVM classifiers, one to detect the sentiment of messages such as tweets and SMS (message-level task) and one to detect the sentiment of a term within a message (term-level task) followed by the contributions of researcher Nasukawa and his team in 2003 (Nasukawa, 2003) who proposed a new method for extracting associated concepts from segments and summing the orientations of the opinion vocabulary present in the same segment.

In 2018 Mauro Dragoni et al proposed a commonsense ontology for sentiment analysis based on SenticNet, a semantic network of 100,000 concepts based on conceptual primitives (Dragoni, 2018). In 2006, researchers Kanayama and Nasukawa (Kanayama, 2006) as well as Ding and Liu (Ding, 2008) in 2008 proposed, for their part, a learning-based approach that uses the coordination conjunctions present between a word already classified and a word unclassified.

A new Approach using deep learning was proposed by Cicero Nogueira dos Santos in 2014 for the analysis of tweets, the authors applied their idea on the corpus STS and they have obtained an accuracy of more than 80% (Dos Santos, 2014). A Multimodal sentiment analysis is a very important growing field of research. A promising area of opportunity in this field is to improve the multimodal fusion mechanism in (Majumder, 2018) Majumder et al have developed a Hierarchical Fusion with Context Modeling based on a Multimodal Sentiment Analysis.

In (Alaei, 2019) different approaches to sentiment analysis applied in the field of data analysis and evaluation of metrics. The paper concludes by outlining future research avenues to further advance sentiment analysis in tourism as part of a broader Big Data approach.

In (Xiang, 2018) a new methodology has been adopted using a machine learning approach with which textual documents are represented by vectors and are used for training a polarity classification model. Several documents' vector representation approaches have been studied, including lexicon-based, word embedding based and hybrid vectorizations. The competence of these feature representations for the sentiment classification task is assessed through experiments on four datasets containing online user reviews in both Greek and English languages, in order to represent high and weak inflection language groups. In (Zheng, 2018) Zheng et al had the idea of sentimental feature selection for sentiment analysis of Chinese online reviews and also in (Proksch, 2019) the authors create a multilingual sentiment-based approach that can effectively capture different types of parliamentary conflict.

In (Araque, 2019), Araque et Zhu proposed a sentiment classification model that uses the semantic similarity measure in combination with embedding representations. In order to assess the effectiveness of this model, the authors perform an extensive evaluation. Experiments show that the proposed method can improve Sentiment Analysis performance over a strong baseline, being this improvement statistically significant.

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