The Psychiatrist (Real-Time Sentiment Analysis of tweets on Twitter for Identifying People with Suicidal Tendencies with AI)

Final Year Project Proposal

(BSCS)

By

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Abstract

Suicide kills more people in the world than war and homicide together. The law enforcement agencies and the health sector in every country is trying hard to control the number of suicide cases. Our project is intended to provide the concerned authorities with the ability to detect suicidal tendencies in social media users. The project aims at detecting the suicidal tweets on twitter in order to identify the people before they try to commit any suicide attempt.

Introduction

Suicide is the cause of **1.4%** of all the deaths globally. According to World Health Organization suicide is the cause of about **8,00,000** deaths every year [1]. The latest suicide rate in Pakistan was recorded to be **2.90%** per **100,000** population in **2016**. It has also been widely observed that people with suicidal thoughts often discuss it on social media and has also been proved by multiple case studies. If identified within time, suicide can be prevented. Therefore, we have proposed a project that will monitor real-time tweets from Twitter using the API, perform sentiment analysis of them through AI and report any tweets and users with suicidal intentions. If the tweet is detected as suicidal, it will be reported to the concerned authority i.e. either Police or Government Officials.

Problem statement

The sudden change in a person's behavior is the most important warning sign of suicide. It is reported by American Foundation for Suicide Prevention **(AFSP)** that the chances of suicide risks of a person are greater if the behavior is new or has escalated, especially if the behavior is due to a painful event or loss. Considering this in association with social media where people are constantly posting messages and express their feelings, suicide warning signs can be detected through real time data.

The task is to analyze every tweet posted on Twitter through its provided API and detect every tweet and user that may be considered suicidal. We are interested in setting where data arrives in real time.

Literature review

Social media is very popular now a days as the number of users is increasing continuously. Many cases like Suicide, Depression etc. are publicly visible now. There are multiple case studies (Sueki, 2014), (O'dea, 2018) that focus on the particular problem of suicidality detection in social networks, they do not take into account the profile itself. They only consider suicide related-communication with the aim of classifying text relating to suicide. However, the biggest challenge for the suicide task is how to detect users who want to commit suicide from their public profiles in social networks.

A case study (De Choudhury et al 2016). [4] explored the potential to use social media to detect and predict major depressive episodes in Twitter users. Using crowd-sourcing techniques, the authors built a cohort of Twitter users scoring high for depression on the CES-D (Center for Epidemiologic

Studies Depression Scale) scale and other users scoring low. Studying these two classes, they found that what is known from traditional literature on depressive behavior also translates to social media. For example, users with a high CES-D score posted more frequently late at night, interacted less with their online friends, and had a higher use of first-person pronouns. Additionally, online linguistic patterns match previous findings regarding language use of depressed individuals [5]. More recently, De Choudhury et al. [6] have shown that linguistic features are important predictors in identifying individuals transitioning from mental discourse on social media to suicidal ideation. The authors showed a number of markers characterizing these shifts including social engagement, manifestation of hopelessness, anxiety and impulsiveness based on a small subset of Reddit posts.

The case study (Coppersmith et al 2016.) [7] examined the data published by Twitter users prior to a suicide attempt and provided an empirical analysis of the language and emotions expressed around their attempt. One of the interesting results found in this study is the increase in the percentage of tweets expressing sadness in the weeks prior to a suicide attempt, which is then followed by a noticeable increase in anger and sadness emotions the week following a suicide attempt.

In the same line of this research, another case study (O'Dea et al 2015.) [8] confirmed that Twitter is used by individuals to express suicidality and demonstrated that it is possible to distinguish the level of concern among suicide related tweets, using both human coders and an automatic machine classifier. These insights have also been investigated by Braithwaite et al. [9] who demonstrated that machine learning algorithms are efficient in differentiating people who are at a suicidal risk from those who are not. For a more detailed review of the use of social media platforms as a tool for suicide prevention, the reader may refer to the recent systematic survey by Robinson et al. [10].

Another case study (Kavuluru et al., 2014) have focused on the writing style using the LIWC tool as a sampling technique to identify 'sad' Twitter posts that were subsequently classified using a machine learning classifier into levels of distress on an ordinal scale, with around **64%** accuracy in the best-case.

The case study (Kavuluru et al., 2016) [11] conducted a suicide study by classifying text relating to suicide on Twitter. They built a set of account classifiers using lexical, structural, emotive and psychological features extracted from Twitter posts. Their aim was to distinguish between the more worrying content, such as suicidal ideation, and other suicide-related topics.

Moreover, the case study (Birjali et al., 2017) [12] based their work on WordNet to analyze semantically Twitter data. They address the lack of terminological resources related to suicide by constructing a vocabulary associated with suicide.

All these existing works have proved that people show their suicidal thoughts and intentions and other problems on the social media. Despite all these works done regarding the suicide prevention, all the works done are only focused on identifying the suicidal tweets and posts and not on identifying the users that posted them.
Therefore, our project aims to contribute to this problem and identify the Twitter user that is posting suicidal tweets so that they can be provided help on time.

Project scope

Our proposed project will monitor real-time tweets from Twitter using the Twitter API, perform sentiment analysis of them through AI on IBM Watson and report any tweets and user's with suicidal intentions on the Web Application. If the tweet is detected as suicidal it will be reported to the person who is concerned with reporting suicides either Police or Government Official.

Project development methodology

The application will be built using Artificial Intelligence and Python. The real time tweet as it is posted will be taken using the Twitter API, analyzed for its sentiment by Artificial Intelligence using IBM Watson. If the tweet analyzed is detected as a suicidal by the application, then the Tweet and the User ID will be displayed on the application's Web based front and will also be saved for future reference.
For the proposed project, we would require the following for a functional result:

- Access to Twitter API
- Python for development of the application (Twitter, NLTK, time etc.)
- Web Development for developing frontend
- Artificial Intelligence/Machine Learning to perform sentiment analysis (Preferably IBM Watson)

Project milestones and deliverables

Tasks	Nov	Dec	Jan	Feb	March	April	May	June
Write Proposal								
Analyze previous Applications								
Acquire required tools								
Test the Systems								
Test User Interface								
Test Modules								
Integrate Modules								

Test the Application								
Implementation								
Phase wise Report								
Phase wise Presentation								
Final Report								
Final Presentation								
Project Brochure								

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