Chapter 12
Suicidal Analysis on Social Networks Using Machine Learning

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ABSTRACT

Suicides are the most critical issues in the present time. Early detection and prevention can assure the safety for the people's lives. As the technology increases rapidly, we are moving towards online channels to express our suicidal thoughts. In the chapter, the authors deal with suicidal ideation through the user generated post on different platforms like Twitter, Facebook, Reddit, Suicide Watch, etc. Analyzing the text, they enrich the knowledge and that can be used as an indicator for suicidal thoughts. To detect suicidal thoughts, they use text processing using NLP, and some features are generated that can be classified using different classifiers like random forest, SVM, naïve bayes, etc., and some neural network models like CNN, LSTM, BERT, etc. are also used for final prediction of suicidal or non-suicidal thoughts. In this chapter, the authors use Distill Bert model for predicting the results and also improve the accuracy by changing the hyperparameters. Here, they summarize the existing work's limitations and discuss future research directions.

INTRODUCTION

In the Present time social networking sites are exploding by the users. People are more drawn to the virtual life since the introduction of Facebook, Instagram, Twitter, Snapchat, Reddit, and other social networking websites. As these websites are quite user friendly so the no of users is increasing day by day. There are almost 900 social networking sites present on the internet at this time, and those sites have

transformed people's perceptions and points of view (Liang & Dai, 2013). We also discovered that there is a distinction between real life and virtual life among the individuals around us. Even we acknowledge that people are more drawn to virtual life than actual life. Here we are only talking about twitter which is one of the most famous social sites.

In 2017, almost 500 million tweets were sent every day, with a daily active user base of 100 million (Aslam, 2018). Here we can post about the social issues, our own thoughts etc. But Some people also used this platform to put suicidal thoughts in their tweets. As we come to know, Suicide is the 2nd largest cause of mortality among 15–29-year-olds all over the world which is given by WHO (World Health Organization) (Bilsen, 2018). Every year, over 80000 individuals die by suicide, or one human being every 40 seconds. Suicide has become a social disease in recent years, and we should think about it. Suicide is motivated by a lot of factors. Suicide is more likely in those with depression, but people without having depression might also experience suicidal thinking. Suicide variables are divided into three categories by AFSP: health factors, historical factor and environmental factors (Ferrari et al., 2014). We investigate the challenge of recognising suicide ideation via social networking websites in this study, with attention on comprehending and identifying suicidal ideas in online content. To comprehend suicidal thinking from a data mining standpoint, we do rigorous analytics of the content, language preferences, and topic description. Suicidal ideation was detected in the data using different methods of Machine Learning. By using feature engineering and classification algorithms, it is the most effective method for detecting suicide ideation in internet content.

LITERATURE REVIEW

Description of Previous Work

Some of the last few research papers which we have gone through and found most research generally based on Content Analysis, Feature Engineering, Deep learning etc. (De Choudhury et al., 2013) investigated the ability to identify and predict major episodes of depression in Twitter users through social media. The researcher used crowd-sourcing approaches to create a group of Twitter users who scored high on the CES-D (Center for Epidemiologic Studies Depression Scale) scale for depression and others who scored low. Furthermore, online linguistic patterns mirror previous findings about sad people's language use (Rude, Gortner, & Pennebaker, 2004). Researchers (De Choudhury et al., 2016) have demonstrated that language traits can help identify those who are shifting from mental discourse on social media to suicidal thoughts.

Authors Coppersmith et al. (2016) looked at data posted by users from Twitters before a suicide attempt and conducted an empirical study of the language and emotions stated. One of the study's most surprising findings is the increase in the percentage of tweets expressing anguish in the weeks preceding up to a suicide attempt, followed by a substantial jump in anger and despair within the week after a suicide attempt. In a similar vein, O'dea et al. (2015) confirmed that people use Twitter to communicate suicidality and shown that, using both human coders and an artificial machine classifier, it is possible to discern the level of worry among suicide-related tweets. Braithwaite et al. (2016) found that algorithms of machine learning are effective in distinguishing those at risk of suicide from those who are not.

In a paper in 2018 Vioules et al. (2018) took the method of automatically detecting unexpected changes in user behavior online. They combine techniques of natural language processing with textual

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