**Hit-back Suicide: An aspect based Sentic Analysis on suicide notes and prevention**

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**Abstract**

*According to the SDG 3.4 – suicide is under Non communicable disease and mental health category. Nearly 800,000 people die by suicide in the world each year, which is roughly one death every 40 seconds. Suicide is the 2nd leading cause of death in the world for those aged 15-24 years. Depression is the leading cause of disability worldwide. There is many research that were done on the suicidal note and the health status of the people who committed suicide. But the present work will extract the treasure of words from the user tweets, because in the present generation everyone is active in the social media and sharing every feeling through the social networking platform. Keeping this in view, the present proposal will extract the keywords technically called as tokens from the review along with the aspects involved for the suicidal feeling. Moreover, using SENTIC we are collecting the semantics for the suicidal thoughts. The early detection of suicidal thoughts is better than later investigation. So, the extracted bag of words can be included in the CEASE corpus.*

**Key Words-** CEASE, Aspect Based Analysis, SENTIC, Text Processing, Word-Cloud

**Introduction**

According to the Suicide Awareness Voice of Education (SAVE) organisation on an average nearly 800000 people commit suicide every year implies one death for every 40 seconds. According to study depression is the primary source for the suicidal thoughts. Moreover, suicide is the 2nd death reason for the age group people between 15-24 years. It is very pathetic to know that the adults and young people are ending their life’s half the journey to the destination. There is big research gap for analysing the emotional reasons for suicidal thoughts. There has already been study that took into consideration the suicidal note and analysed the victim behaviour. But this becomes the major drawback. Because, once after person is death there is no point of analysing the suicidal note. So, the present proposed paper will help in analysing the comments and reviews of the social media user. In the present proposal we are extracting the tweets based on keyword suicide. And then follow the Sentic based analysis and compare it with aspect-based analysis. Finally, we will come up with world-cloud representation of the aspects that result in suicide. By doing this we may come to know the user reaction well in advance and avoid them from committing suicide.

**Literature Review**

The paper titled “CEASE, a Corpus of Emotion Annotated Suicide notes in English” by Soumitra Ghosh, Asif Ekbal and Pushpak Bhattacharyya [1] they have proposed a corpus that involved 201 suicide notes and labelled the dataset that thy collected with 15 emotions namely (forgiveness, happiness peacefulness, love, pride, hopefulness, thankfulness, blame, anger, fear, abuse, sorrow, hopelessness, guilt, information, instructions). The extension of previous paper is “A Multitask Framework to Detect Depression, Sentiment and Multi-label Emotion from Suicide Notes” [2]in which they have primarily focused on the depression and the sentiments of the people who are in such situation with CEASE corpus and added additional notes in the corpus. The emotional status of the people supports the depression for the suicide. But the research gap is that they have included only the suicide notes and analysed the behaviour of the individual. The corpus could have been more enriched if they have used the social media comments and reactions of the individual as the historic part of their study. Through the review articles titled “Attention in Psychology, Neuroscience, and Machine Learning” [3] by Gatsby Computational Neuroscience Unit, Sainsbury Wellcome Centre, University College London, London, United Kingdom and “Crossing the Cleft: Communication Challenges Between Neuroscience and Artificial Intelligence” [4] by Department of Cognitive and Emerging Computing, Sandia National Laboratories, Albuquerque, NM, United States I got the background support for my case study for developing the aspect words through the user reviews using aspect sentiment analysis. These articles highlighted the relationship between the biological neuron and AI by stating that the psychological behavior can be imitated using the Neural Network in AI. To implement my idea, I came across “SENTIC” [5] in Sentic Computing book by Erik Cambria, Amir Hussain. To perform the analogical reasoning and emotion recognition in my study, I have chosen this package over others.

**Need for the Study**

For every 40seconds we can see at least one individual committing suicide. Its very devastating but on an average 800000 people commit suicide [6]. To reduce the rate of suicide throughout the world, the present proposal helps in examining the reviews of the users in social media and highlight the aspects that triggers the suicidal thoughts.

The proposed model can be used by social media community to analyse the reviews of their users by embedding this model in their project model. Once the aspects for suicide are analysed, we can prevent the suicides by showing the content that makes them refreshed. The main objective of the proposal is to prevent suicide and create the aspects words that results in suicidal activities and thoughts.

**Proposed Methodology with Implementation**

For extracting the more informative words from the twitter for the suicidal activities, the following pipeline is used in the present proposed system. Initially the data was extracted from the twitter using the Snscrape package. Later, the text pre-processing like removal of html tags, URLs, emojis, and punctuations. To understand the context involved, we have used the aspect-based sentiment analysis. In the aspect-based sentiment analysis we will consider the POS tagging and accordingly extract the aspects involved in the review or comment. Through aspect-based sentiment analysis, we extracted the Compound score, aspects and the emotions that trigger the suicidal thoughts. Later, using the defined aspect analysis, there is possibility of losing important words. To cover those words, we used SENTIC package[7][8] to extract the relevant semantics from the collected tweets. In this way we could effectively collect the emotions, feelings and textual context that trigger the suicidal thoughts in the people.

Diagram

Description automatically generated

**Fig 1 – NLP Pipeline used for implementation of proposed model**

**Results and Discussion**

Through our proposal we could successfully gather 83703 contextual aspect words, along with 30712 feelings of suicidal thoughts. Moreover, using SENTIC we extracted 29198 semantics for the tweets extracted for the suicidal thoughts.

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**Fig 2 – Word Cloud displaying the aspect keywords**

Through the above we cloud, we can analyse that the aspects like never ending processes that back step the people very often and rarely finding people to share their views tore them from within which may trigger the suicidal thoughts in the individual.

**Text

Description automatically generated**

**Fig 3 – Word Cloud displaying the feelings that impact the Suicide through Aspect based Analysis**

The feelings that trigger the suicide are discrimination, lack of hope, not at every point in their life, listening negative conversation, isolation, not coping with society to socially interact, bothering thoughts. The above word cloud was not significantly highlighting the key aspects of suicide feeling. So, using SENTIC we could possibly find the more apt and relevant words from the tweets that trigger the suicidal thoughts. They are economy, illness, pity, complacent, abortionist, allurement, etc. So, we can say that the pre-defined packages can be used for the refined final treasure of words in comparison with the direct extracted words from the tweets.

**Text

Description automatically generated**

**Fig 4 – Word Cloud displaying the semantics of words for suicidal feelings through SENTIC package**

**Conclusion**

The proposed model is enhancement for CEASE, it will extract the new and relevant semantic words from the user tweets that trigger the suicidal thoughts. The direct usage of the reviews will not give the apt words for corpus, so the SENTIC package is best to find the semantics for the user tweets. These words will help in analysing the user behaviour in the social network. Through our proposal we could successfully gather 83703 contextual aspect words, along with 30712 feelings of suicidal thoughts. Moreover, using SENTIC we extracted 29198 semantics for the tweets extracted for the suicidal thoughts.

**Future Scope**

The present model can be extended with other languages too. And this model can be embedded in the social networking algorithm to trigger the bots that will help in diverting the useful content to the users when they analyse the words as the risk factors for suicide. We can even improve the aspect-based analyses by using the n-gram approach.

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