

Analysis of Messages in social media, Identification of Suicidal Types

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Abstract - This project describes content analysis of text with to identify suicidal tendencies and types. This article also describes how to make a sentence classifier that uses a neural network created using various libraries created for machine learning in the Python programming language. Attention is paid to the problem of teenage suicide and «groups of death» in social networks, the search for ways to stop the propaganda of suicide among minors. Analysis of existing information about so-called «groups of death» and its distribution on the Internet.

Index Terms - suicidal tendencies, neural network, groups of death, machine learning.

I.INTRODUCTION

Suicide ideation expressed in social media has an impact on language usage. Many at-risk individuals use social forum platforms to discuss their problems or get access to information on similar tasks. The key objective of our study is to present ongoing work on automatic recognition of suicidal posts. We address the early detection of suicide ideation through deep learning and machine learning-based classification approaches applied to Reddit social media. For such purpose, we employ an LSTM-CNN combined model to evaluate and compare to other classification models. Our experiment shows the combined neural network architecture with word embedding techniques can achieve the best relevance classification results. Additionally, our results support the strength and ability of deep learning architectures to build an effective model for a suicide risk assessment in various text classification tasks.

Suicide ideation is viewed as a tendency to end ones' life ranging from depression, through a plan for a suicide attempt, to an intense preoccupation with self-destruction. At-risk individuals can be recognized as suicide ideators (or planners) and suicide attempters (or completers). The relationship between these two

categories is often a subject of discussion in research communities. According to some studies, most of the individuals with suicide ideation do not make suicide attempts. For instance, Klonsky et al. believes that most of the oft-cited risk factors (depression, hopelessness, and frustration) connected with suicide are the predictors of suicide ideation, not the progression from the ideation to attempt. However, Pompili et al. reveals that a suicide ideator and suicide attempter can be quite similar to “several variables assumed to be risk factors for suicidal behavior”. In WHO countries, early detection of suicide ideation has been developed And implemented as a national suicide prevention strategy to work towards the global market with the common aim to reduce the suicide rates by 10% by 2020.

Social media with its mental health-related forums has become an emerging study area in computational linguistics. It provides a valuable research platform for the development of new technological approaches and improvements which can bring a novelty in suicide detection and further suicide risk prevention. It can serve as a good intervention point. Kumar et al. studied the posting activities of Reddit Suicide Watch users who follow news about celebrity suicides. He introduced a method that can be efficient in preventing high profile suicides. He developed a propensity score matching-based statistical approach to derive the distinct markers of this shift. Recently, Ji et al. has developed a novel data protecting the solution and advanced optimization strategy (AvgDiffLDP) for early detection of suicide ideation.

The primary objective of our study is to share the knowledge of suicide ideation in Reddit social media forums from a data analysis perspective using effective deep learning architectures. Our main task is to explore the potential of Long Short-Term Memory (LSTM), Convolution Neural Network (CNN) and their combined model applied in multiple

classification tasks for suicide ideation struggles. We try to test if an implementation of CNN and LSTM classifiers into one model can improve the language modeling and text classification performance. We will try to demonstrate that LSTM-CNN model can outperform the performance of its individual CNN and LSTM classifiers as well as more traditional machine learning systems for suicide-related topics. Potentially, it can be embedded on any online forum's and blog's data sets.

In our experiment, we first choose the data source, define our proposed model and analyze the baseline characteristics. Then, we compute the frequency of n-grams, such as unigrams and bigrams, in the dataset to detect the presence of suicidal thoughts. We evaluate the experimental approach based on the baseline and our proposed model.

II. OBJECTIVE

Our study has specific three-fold contributions:

N-gram analysis: we evaluate the n-gram analysis to show that the expressions of suicidal tendencies and reduced social engagements are often discussed in suicide-related forums. We identify the transition towards the social ideation associated with different psychological stages such as heightened self-focused attention, a manifestation of hopelessness, frustration, anxiety or loneliness. **Classical features analysis:** using CNN, LSTM and LSTM-CNN combined model analysis, we evaluate bag of words, TF-IDF and statistical features performance over word embedding. **Comparative evaluation:** we explore the performance of LSTM-CNN combined class of deep neural networks as our proposed model for detection of suicide ideation tasks to improve the state-of-the art method. In terms of evaluation metrics, we compare its strength and potential with CNN and LSTM deep learning techniques and four traditional machine learning classifiers including SVM, NB, RF and XGBoost) on the real-world dataset.

Several studies advocate the impact of social network reciprocal connectivity on users' suicide ideation. Hsiung observed the users' behavior changes in reaction to a suicide case which happened within the social media group. Jashinsky et al. emphatically highlighted the geographic correlation between the suicide mortality rates and the occurrence of risk factors in tweets. Colombo et al. studied the tweets

containing suicide ideation based on the users' behavior in social network interactions resulting in a high degree of reciprocal connectivity and strengthening the bonds between the users.

Similarly, conducted profound research on one million Twitter posts following the suicide of 26 prominent celebrities in Japan between the years 2010 and 2014. Identification of regular language patterns in social media text leads to a more effective recognition of suicidal tendencies. It is often supported by applying various machine learning approaches on different NLP techniques demonstrated that machine learning algorithms are efficient in differentiating people to those who are and who are not at suicidal risk. Sueki studied a suicidal intent of Japanese Twitter users in their 20s, where he stated that a language framing is important for identifying suicidal markers in the text. For instance, "want to suicide" expression is more frequently associated with a lifetime suicidal intent than "want to die" expression studied the adaptation of information retrieval methods for identifying a destructive informational influence in social networks. He built a dictionary of terms pertaining to a suicidal content. He introduced TF-IDF matrices and singular vector decompositions for them. Sawhney et al. improved the performance of Random Forest (RF) classifier for identification of suicide ideation in tweets.

Using CNN networks, he built a binary classifier to separate suicidal tweets from non suicidal tweets. Other recent studies revealed positive results of CNN implementations on Suicide Watch forum which serves as a dataset in our research paper. Fundamentally, single recurrent and convolution neural networks applied as vectors to encode an entire sequence tend to be insufficient to capture all the important information sequence. As a result, there have been several experiments to develop a hybrid framework for coherent combinations of CNNs and RNNs to apply the merits for both. For instance, He et al. introduced a novel neural network model based on a hybrid of ConvNet and BI-LSTMs to solve the measurement problem of a semantic textual similarity. Matsumoto et al. proposed an efficient hybrid model which combines a fast deep model with an initial information retrieval model to effectively and efficiently handle AS. In our study, we propose a framework based on the ensemble of LSTM and CNN

combined model to recognize suicide ideation in social media.

III. EXISTING SYSTEM

In the existing system examine the relationship between social networks and suicide ideation using a data set obtained from a dominant social networking service (SNS), named mixi. In this approach addresses limitations very less. First, an entire social network of users is available, where a link between two users represents explicit bidirectional friendship endorsed by both users. Some users have quite a large number of friends, as in general social networks. Second, for the same reason, we can accurately calculate the number of triangles for each user. An additional feature of the present data set is that the sample is relatively diverse because anybody can register for free.

IV. PROPOSED SYSTEM

The study Experience of content analysis of suicidal statements on the Internet of persons with different levels of suicidal activity» collects data from the pages of people who have actually committed suicide or are potential suicides. By analyzing the collected information, program called TextAnalyst explores the causes of suicidal behavior and their feelings. The aim of the current study is to classify sentences into suicidal and non-suicidal using a neural network. In our system, according to random text, it is necessary to determine whether it is suicidal or not, i.e. to solve the problem of its binary classification. Classification is the distribution of data by parameters.

V. IMPLEMENTATION

User: The User can register the first. While registering he required a valid user email and mobile for further communications. Once the user register then admin can activate the customer. Once admin activated the customer then user can login into our system. In this project the cnn model already loaded then user can test a tweet message. First user will send an tweet message.

Admin: Admin can login with his credentials. Once he login he can activate the users. The activated user only login in our applications. In the media folder data.csv file contain label and tweet. By using this we can build the neural network model.

Building Model: We are pretending that we are developing a system that can predict the label of textual tweet as either suicidal or non-Suicidal. This means that after the model is developed, we will need to make predictions on new textual tweet. Remove all words that are not purely comprised of alphabetical characters.

Prediction Results: We use a Convolution Neural Network (CNN) as they have proven to be successful at document classification problems. A conservative CNN configuration is used with 32 filters (parallel fields for processing words) and a kernel size of 8 with a rectified linear ('relu') activation function. This is followed by a pooling layer that reduces the output of the convolution layer by half. Next, the 2D output from the CNN part of the model is flattened to one long 2D vector to represent the 'features' extracted by the CNN. The back-end of the model is a standard Multilayer Perceptron layers to interpret the CNN features. The output layer uses a sigmoid activation function to output a value between 0 and 1 for the negative and positive sentiment in the review. We use a binary cross entropy loss function because the problem we are learning is a binary classification problem. The model is trained for 10 epochs, or 10 passes through the training data

VI. CONCLUSION

Among all models for content analysis of the text, this one differs in that it classifies suicidal sentences, which is extremely useful for reducing the death rate from suicide, which exceeds the death rate from military actions, murders and road accidents. It should be noted that «death groups» were seen not only in «Vkontakte», but also in other social networks and messengers, such as Telegram, Instagram, etc. This neural network can be used to check the text in social networks to block posts containing suicidal overtones, what will prevent the spread and promotion of suicide among young people who cannot imagine life without social networks. Also, this program can be used for parental control, if the parent does not want to violate the privacy of personal messages of the child but is worried about him: it is enough to collect data and provide them to the program. Also, this neural network can be used to block communities that contain a

suspiciously large number of posts with suicidal content.

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