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SUICIDAL TENDENCY DETECTION

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ABSTRACT:

Suicidal Tendency or the intension to kill oneself or end one's life is a catastrophic situation which is mostly unknown by any person in the victim's life. Suicide has been an intractable public health problem despite advances in the diagnosis and treatment of major mental disorders. In many studies it is clearly evident that, victims tend to kill themselves either to end their pain or pressure or to have a sense of relief that they are not going to live in this world anymore. This project aims to propose a method that helps the family, friends or the close ones of the victim to immediately detect if the person has already started feeling the sense of depression. The main aim is to find a strong co-relation between components in the subsystem and compare the accuracies to build an alarming system. "Better late than never" the victim can be saved by the proposed method and immediate treatment can be started. Unlike the existing systems, this project aims to detect the suicidal tendencies in multiple aspects instead of focusing on a single perspective.

1.INTRODUCTION

This project aims to focus on the people who have an intension to kill themselves. In this consequence, multi-faceted method that can detect this tendency and intimate the family, friends or the close ones beforehand can prove to be a boon for the invention. This project tends to consider an electronic device particularly a mobile (as used by most of them) is the key element. This device is used to

capture different elements like facial gestures, speech recognition and many more. A trivial concept of incorporating different aspects like: Facial Gestures, Voice Recognition and Messaging Patterns follow the bandwagon along with the technical byproducts of the project. Facial gestures include unhappy expressions like sad, dull, tired; voice patterns include low voices that sound dull are easy to recognize that someone is

unhappy; Texting patterns include unusual texting patterns that indicate lack of interest in doing activities.

- The objective of this system is that it is capable of detecting suicidal tendency in a specific person. Unlike other existing system this system can ensure the ability to focus on different technical aspects rather than single one.
- The project aims to find co-relation between the three components present below.
- Facial Gesture Detection – Human Computer Interaction
- Speech Recognition – Natural Language Processing
- Messaging Patterns – Text Tokenization through NL

II.EXISTING SYSTEM

Since suicide is not a decision made up in a single day, many researches had been done in the past on various aspects. While some of them included how suicides occur and others concluded with some methodologies on how to detect suicidal intension. Distinct approaches using Human Computer Interaction, Natural Language Processing and using Convolutional Neural Networks were highly popular. But these systems possessed a drawback

that, it was not practically possible to indicate a clear demarcation in only one aspect of implementation. In course of time, numerous approaches have been proposed with the advancement in the technology which is to perform text mining and sentiment analysis on social media platforms like reddit and twitter.

III.PROPOSED SYSTEM

This project aims to propose a system that is capable of detecting suicidal tendency using multiple approaches. Three technologies namely Human Computer Interaction, Natural Language Processing and voice pattern analysis are taken into consideration to perform a detailed execution. Later a correlation matrix is proposed to be implemented that is able to find strong or weak correlations between the above three components.

IV.IMPLEMENTATION:

- Data Collection Module: The data collection module is tasked with gathering relevant data related to suicidal tendencies. This data can be sourced from various channels such as surveys, questionnaires, social media platforms, or healthcare records. The module ensures that the

collected data is comprehensive and representative of the target population, adhering to ethical guidelines and privacy regulations.

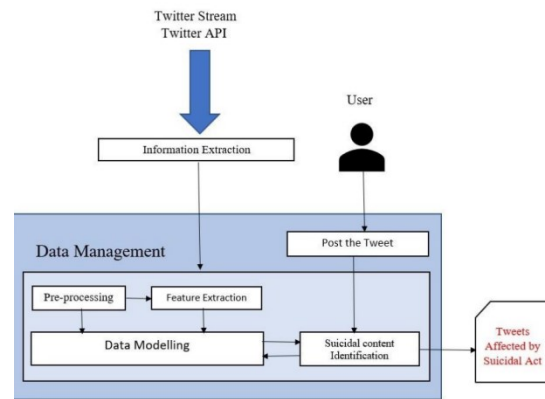
- **Data Preprocessing Module:** The data preprocessing module is responsible for preparing the collected data for analysis and modeling. It encompasses several tasks, including data cleaning, feature engineering, normalization or scaling of features, and encoding categorical variables into numerical representations. Additionally, it addresses challenges such as handling missing values, outliers, and imbalanced class distributions to ensure the quality and integrity of the dataset.
- **Data Splitting Module:** The data splitting module divides the preprocessed data into separate subsets for training and testing purposes. Typically, a certain proportion of the dataset is allocated for training machine learning models, while the remainder is reserved for evaluating model performance. By splitting the data, the module enables the assessment of model generalization and effectiveness on

unseen data, facilitating robust model development.

- **Machine Learning Module:** The machine learning module applies advanced algorithms to the training data to construct predictive models for detecting suicidal tendencies. This module incorporates techniques such as Convolutional Neural Networks (CNNs) and Random Forests. For instance, in CNN implementation, deep learning frameworks like TensorFlow or PyTorch are utilized to design and train models capable of processing diverse data types such as textual or image-based inputs. Conversely, Random Forest implementation involves leveraging machine learning libraries like scikit-learn to create and optimize classifiers based on decision trees, utilizing preprocessed features for training.
- **Prediction Module:** The prediction module leverages the trained machine learning models to make predictions on new or unseen data instances. Once the CNN and Random Forest models are trained using the respective machine learning module, they are deployed

to predict suicidal tendencies based on features extracted from new data points. This module serves as the final stage in the pipeline, enabling the application of predictive models in real-world scenarios to identify individuals at risk of suicidal behavior and facilitate timely intervention and support.

The method proposed in this project first identifies the suicidal keywords, and then we use these keywords to extract tweets from Twitter using Twitter Streaming Application Programming Interface (API). After that we pre-process the data or extract features from the text document. Then SVM and Decision Tree with three types of weight optimizers are imposed on the dataset and at last we determine the model efficiency on the basis of accuracy score, precision, recall and F1 scores. Tweets are retrieved from twitter data and intensity of suicidal tendency is calculated based on the weightage given to the word. Among the two types of machine learning approach we followed supervised learning for this proposed method. A flowchart that represents the proposed model is as follows



Results of classification results using features based on tweets. When we use only features based on tweets, below table shows the accuracy, precision and recall, and Completion Speed of our model in recognizing suicidal posts on tweeter. A 10-fold cross validation was used in the experiments. Table shows that the Decision Tree classifier achieves the best accuracy of 97.89%, precision of 97.89%, recall 97.38% and Naïve Bayes classifier complete a speed of 5.35 second which is the fastest speed among the remaining algorithms.

Algorithms Implemented	Accuracy	precision	recall	Completion Speed (unit in second)
Support vector Machine	92.89%	93.53%	91.41%	1105.52
Decision Tree	97.89%	97.89%	97.38%	18.70
Naïve Bayes	93.29%	89.23%	89.04%	5.35

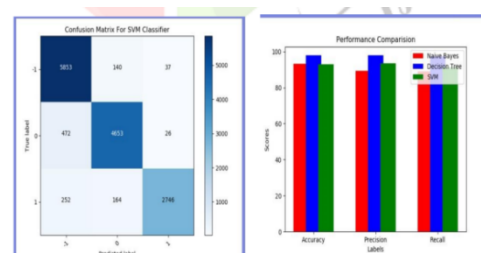
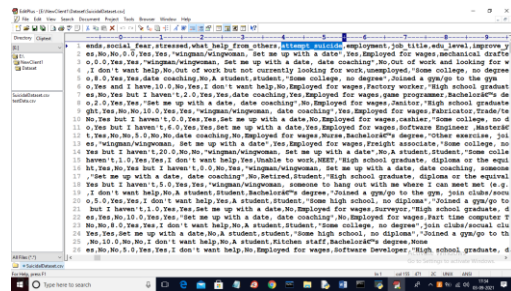


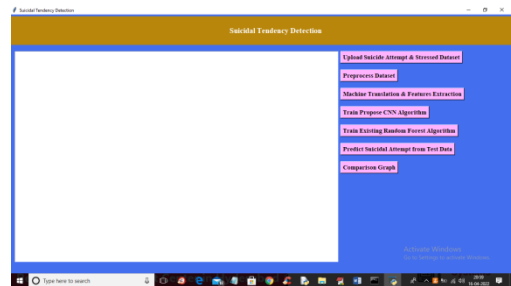
Fig.1. Output results.

dataset contains 'suicidal_attempt' and 'stressed' column.

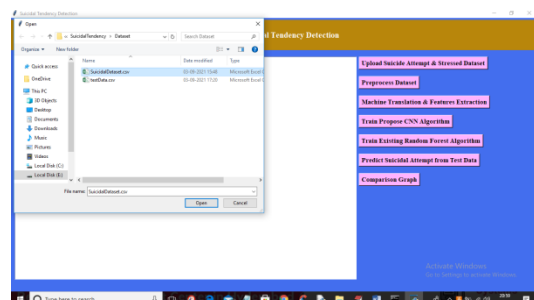


In above dataset screen you can see dataset contains 'attempt_suicide' and 'stressed' column. We will use above dataset to train ML algorithms.

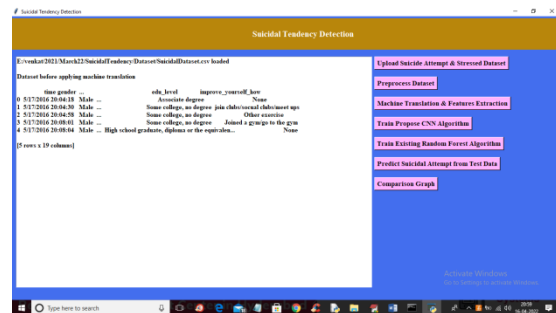
To run project double click on 'run.bat' file to get below screen



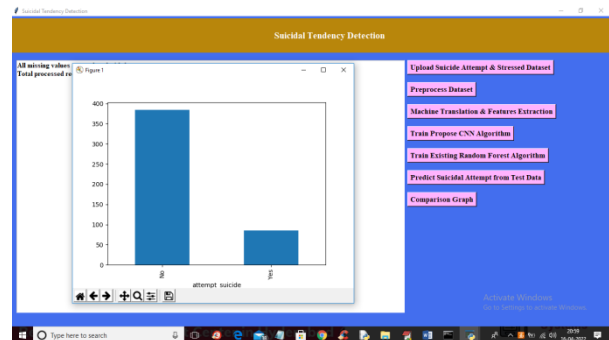
In above screen click on 'Upload Suicide Attempt & Stressed Dataset' button to upload dataset and to get below screen



In above screen selecting and uploading 'Suicidal' dataset and then click on 'Open' button to load dataset and to get below screen

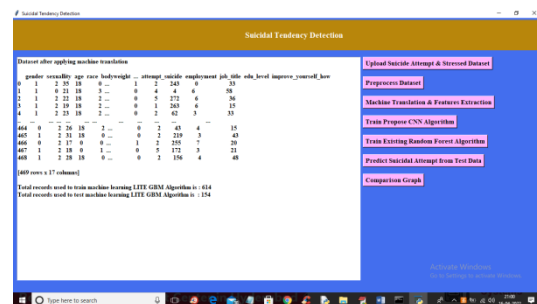


In above screen dataset loaded and we can see some records from dataset and dataset contains some non-numeric characters and to translate them first click on 'Preprocess Dataset' button to remove missing values and then replace with 0

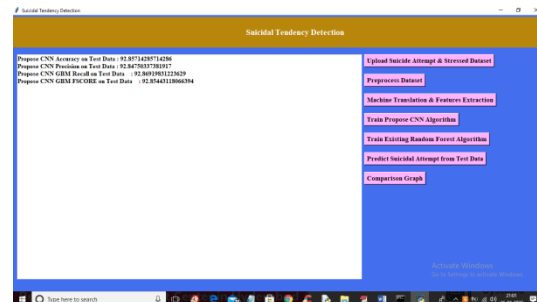


In above screen we can see all missing data is replaced with 0 and we can see dataset contains total 469 records. In graph we can see total patients with and without suicidal thought. In above graph X-axis represents YES and NO values and y-axis represents total counts of YES and NO patients. YES means patients has suicidal thoughts and NO means patients has no suicidal thoughts. Now close above graph and then click on 'Machine Translation & Features Extraction' button to translate all dataset NON-

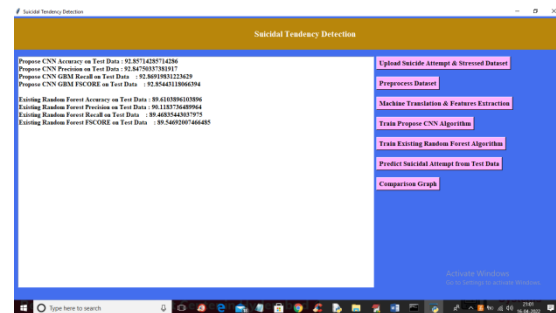
NUMERIC features to NUMERIC features.



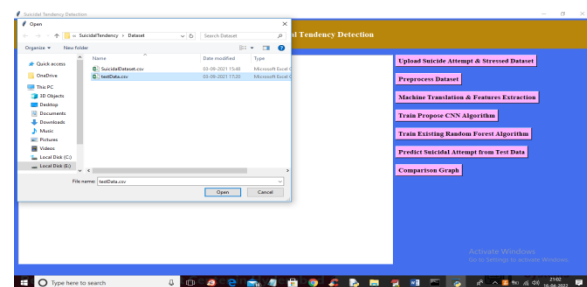
In above screen we can see complete dataset is translated to numeric data and in below two lines we can see dataset using 614 records to train CNN algorithms and using 154 records for testing CNN performance. Now train and test data is ready and now click on ‘Train Propose CNN Algorithm’ button to train CNN with above dataset and to get below output



In above screen we can see with CNN we got 92% accuracy and now click on ‘Train Existing Random Forest Algorithm’ button to train existing Random Forest algorithm on same data and calculate accuracy

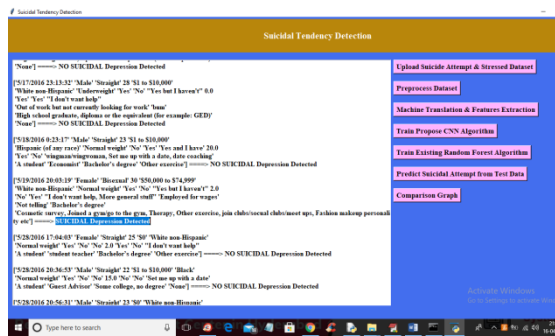


In above screen with existing random forest algorithm we got 89% accuracy and now click on ‘Predict Suicidal Attempt from Test Data’ button to upload test data and then CNN will predict whether test patient records has any suicidal and NO suicidal thoughts.

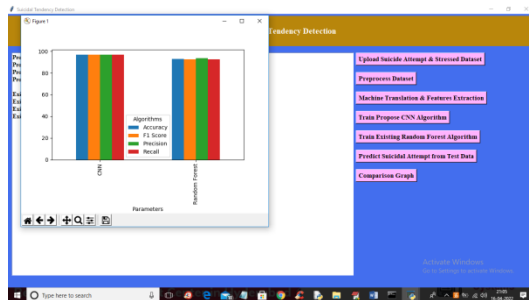


In above screen we are selecting and uploading ‘testData.csv’ file and then click on ‘Open’ button to load test data and to get below prediction result

In above screen in square brackets we can see patient test records values and after arrow symbol ‘====>’ we can see prediction result from CNN as whether patient has suicidal thoughts or NOT. You can scroll down above screen to get all predicted records like below screen



Now click on 'Comparison Graph' button to get below graph



In above graph x-axis represents algorithm names and y-axis represents accuracy, precision, recall and FSCORE in different colour bars. In above graph we can see CNN is performing well compare to existing Random Forest algorithm.

V.CONCLUSION

Machine Learning applied to detect suicide intention and depression amongst individual is effective as traditional approaches are hindered by factors like face-to-face conversation and shyness to express themselves. In the future I would like to delve more into context analysis via the retweet history and given links to external sites. Even though ML seems to be a better method, yet it entails some

shortcomings, like eventually having to use human intervention to approve the predictions by the ML model, it's limited to detecting suicidal tendencies and depression and contextual analysis as the data collected doesn't come with prior background explanation. The amount of text keeps increasing with the popularization of social networking services. And suicide detection and prevention remain a crucial task in our modern society. It is therefore essential to develop new methods to detect online texts containing suicidal ideation in the hope that suicide can be prevented. In the project an automatic recognition of suicidal posts is presented using machine learning techniques As a future scope we can implement some more algorithms to improve the efficiency and quality of work and we can implement the same project on videos using image processing techniques.

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