Real Time Suicidal Ideation Detection and Prediction Based On Machine Learning

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Abstract -In modern society, suicide is a critical issue. To save people's lives, early detection and prevention of suicide attempts should be addressed. Military workers have greater psychological stress and are at higher risk of suicide attempt relative to the general population. High mental stress can trigger ideals of suicide that are crucially driving suicide attempts. In intervention and prevention strategies, identifying predictors of suicide attempts is important, but because of the low base rate and underpowered statistical methods, discovering predictors has proved difficult. The objective of the current study was to use machine learning among high-risk suicidal soldiers who obtained outpatient mental health services to explore predictors of suicidal behaviours. This paper uses machine learning techniques such as logistic regression, decision tree, random forest, regression tree gradient boosting, help vector machine, and multilayer perceptron to predict the existence of suicide ideation by military males and females in six significant psychological stress domains. The accuracy of all six methods of machine learning is greater than the current methodology. This combination has greater sensitivity than many suicidal behaviour prediction models that have previously been used. Overall, this research presents a combination of factors that can be tested clinically to better classify suicidal persons at high risk.

*Key Words***:**BSRS5 , Anxiety , Water Level , Rain detector , Machine Learning , Prediction

1.INTRODUCTION

Now days, many peoples are vulnerable to psychological stress because of tense physical training, multiple deployments and responsibilities. The prevalence of major depression was reported, ranging from 2.0% to 37.4% in the US military, and that of combat-related posttraumatic stress disorder (PTSD) was reported 2.0%–17.0% among US military war veterans. A meta-analysis showed consistent results that the worldwide pooled prevalence of PTSD in rescue workers was up to 10.0%. The symptoms of mental disorders developed frequently in those of continued combat exposure and those of repeated deployments. The association between military absenteeism and mental health problems has been discussed. The rate of suicide attempt among active duty US Army personnel has been increasingly higher than that in the civilians. According to an analysis for 27,501 military participants in, 14.3% of survey respondents reported suicide ideation and 3.0% committed suicide. In other words, 21% of those with suicide ideation had suicide attempt. As is known, previous studies have revealed a relationship between suicide ideation and psychological stress. To early predict the presence of suicide ideation and further prevent the behavior of suicide are essential and important in the military. With the technology improvement and the availability of various kinds of real world big data, artificial intelligence (AI) grows fast accordingly.

Web application is a part of this project. By using machine learning algorithms such as Naive Bayes depression level of user is classified into different levels and provides doctor's location near to user location. As depression is very serious problem which is increasing day by day, many people are suffering from this problem. In India, out of total population 7.5% of it facing this problem. It seems to be major issue and that is the reason it motivate us to worked on it .Earlier diagnosis of depressed patient were done on basis of questionnaires and its behaviour reported by his relatives or friends. But the result was not so qualitative and accurate. In contrast with that, social media is powerful tool for predicting depression levels of an individual.

2. Literature Survey

A framework for depression dataset to build automatic diagnoses in clinically depressed Saudi patient by Lubanayusuf (2016).
Depression is a public health problem that has high effects on a person's functional and social relationships. Depression is a growing problem in the society. It causes pain and suffering not only to patients, but also to those who care about them. Depression disorder is hard to diagnose, because its symptoms could be confused with other disorders and has different cross-cultural symptoms. This paper proposes a framework that would best solve the problem of automatic depression detection in depressed Saudi patients. This paper particularly focuses on designing the collection of Saudi depression dataset using multiple modalities.

Title: Detection of Clinical Depression in Adolescents' Speech During Family Interactions by Nammana C madague (2015).

The properties of acoustic speech have previously been investigated as possible cues for depression in adults. However, these studies were restricted to small populations of patients and the speech recordings were made during patients' clinical interviews or fixed-text reading sessions. Symptoms of depression often first appear during adolescence at a time when the voice is changing, in both males and females, suggesting that specific studies of these phenomena in adolescent populations are warranted. This study investigated acoustic correlates of depression in a large sample of 139 adolescents (68 clinically depressed and 71 controls).

[3]Analysing Psychosocial Difficulties in Depression: A Content Comparison between Systematic Literature Review and Patient Perspective by KaloyanKamenov (2014).

Despite all the knowledge on depression, it is still unclear whether current literature covers all the psychosocial difficulties (PSDs) important for depressed patients. The aim of the present study was to identify the gaps in the recent literature concerning PSDs and their related variables. Psychosocial difficulties were defined according to the World Health Organization International Classification of Functioning, Disability and Health (ICF). A comparative approach between a systematic literature review, a focus group, and individual interviews with depressed patients was used. Literature reported the main psychosocial difficulties almost fully, but not in the same degree of importance as patients' reports.

[4]An improved model for depression detection in micro blog social network by Xingu wang (2013).

Social networks contain a tremendous amount of node and linkage data, providing unprecedented opportunities for a wide variety of fields. As the world's fourth largest disease, depression has become one of the most significant research subjects. Previously, a depression classifier has been proposed to classify the users in online social networks to be depressed or not, however, the classifier takes only node features into account and neglects the influence of linkages. This paper proposes an improved model to calculate the probability of a user being depressed, which is based on both node and linkage features. The linkage features are measured in two aspects: tie strength and interaction content analysis. Moreover, the propagation rule of depression is considered for improving the prediction accuracy.

[5]Toward the development of cost effective e-depression effective system by TaunD Pham (2012).

Diagnosis and prevention of depressive disorders at any scale have been attracting considerable attention of the public healthcare in Japan because depression is one of the most rapidly pervasive mental disorders in the country. A major issue that hinders the feasibility of depression screening for its prevention is the availability of some simple and cost-effective methods for depression detection and monitoring. Here in this paper, we present the development of a computerized tool for depression detection. The tool utilizes the theory of chaos and systems complexity to extract robust dynamically statistical features of physiological signals provided by the low-cost technology of photoplethysmography.

[6] Depression and pain Comorbidity by Matthew J. Bair (2012).

Because depression and painful symptoms commonly occur together, we conducted a literature review to determine the prevalence of both conditions and the effects of comorbidity on diagnosis, clinical outcomes, and treatment. The prevalences of pain in depressed cohorts and depression in pain cohorts are higher than when these conditions are individually examined. The presence of pain negatively affects the recognition and treatment of depression. When pain is moderate to severe, impairs function, and/or is refractory to treatment, it is associated with more depressive symptoms and worse depression outcomes (eg, lower quality of life, decreased work function, and increased health care utilization).

3. Proposed Methodology

The six input factors of psychological stress for machine learning include BSRS-5 score, anxiety, depression, hostility, interpersonal sensitivity and insomnia.This paper uses six machine learning techniques including logistic regression (LR), decision tree (DT), random forest (RF), gradient boosting decision tree (GBDT), support vector machine (SVM) and multilayer perceptron (MLP) for the prediction of the presence of suicide ideation of the military members.

ADVANTAGES PROPOSED SYSTEM

●Psychiatrist, parents, and friends, could track the user depression by the proposed tool, which will save the time before the depressed user could get into major depression phase.
● UGC in a correct way might help to maintain people's mental health or diagnose at an early stage.
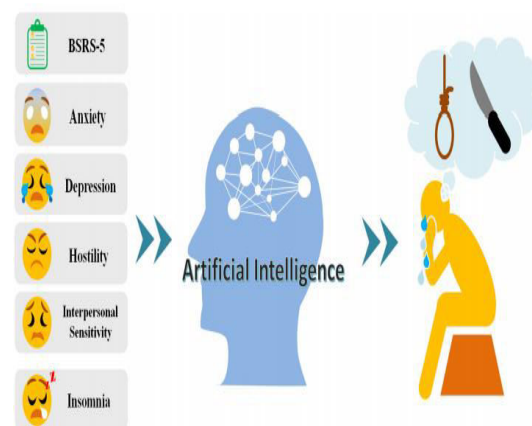

System Architecture

System architecture is used to design and develop an web application, which provide an easy and convenient way to get information about depression levels of user by using machine learning algorithms and according to the location of user, the information about doctor is provided. The extraction class will performed the extraction of textual data from facebook through facebook graph API.Preprocessing class is used to preprocess the extracted data. Data must be clear,right and it is preprocessed for taking care of missing or repetitive attributes. The data ought to be complete and reliable data to deliver the best result from the data mining methodology.

Preprocessing of data takes place by using techniques such as tokenization, lower case conversion, word stemming and words removal. Term frequency (tf) has been computed to measure term occurrence. In proposed system user is on Facebook, according to his Facebook post system can find out user in stressed or

not as well as different quaternaries which is provided by the system. If user's are not on Facebook they can attempt only quaternaries which is provided by the system according to that we can find out user's in stressed or not.
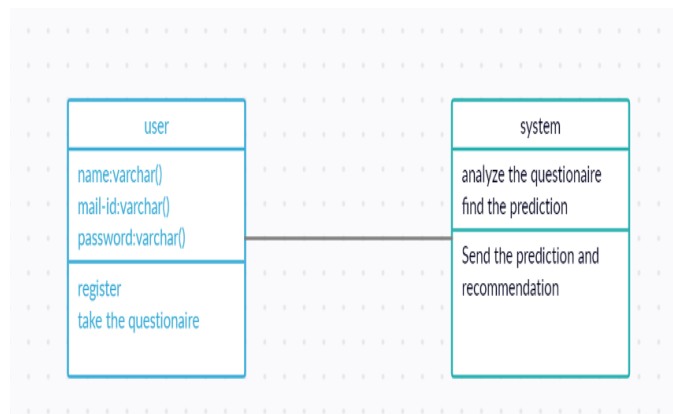
Class Diagram
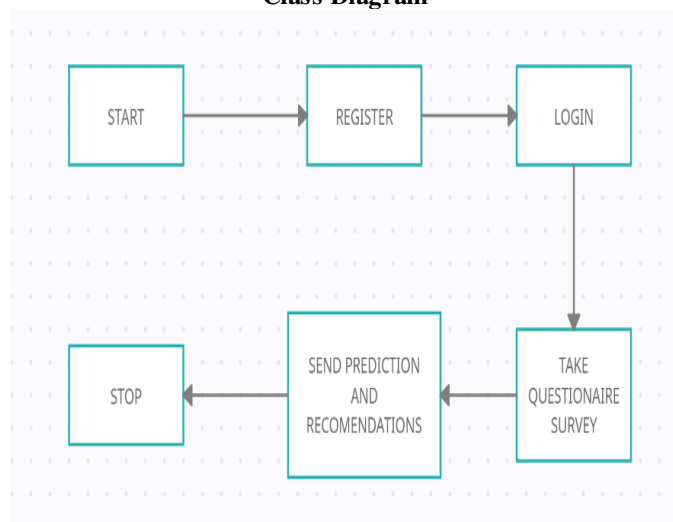
Data Flow Diagram

MODULES
- Collection of Real time datasets
- Register and Login
- Classification of Image into OCR
- Sentiment analysis
- Gives suggestions

MODULE DESCRIPTION

COLLECTION OF REAL TIME DATASETS

In this section users can login the organism .If username and password is right login successful otherwise you enter the accurate username and password .If the user do not have any username and password then the user can Registered with the system. In this system user can register the particulars like name ,email id, username , password ,mobile no and then go the login page enter the particulars then advance the process.

REGISTER AND LOGIN
A data set is a collection of data. Most commonly a data set corresponds to the contents of a single database table, or a

single statistical data matrix, where every column of the table represents a particular variable, and each row corresponds to a given member of the data set in question. Here we collect the positive and negative type of datasets. Using this dataset we are analysing with users data and produce the output.

SENTIMENT ANALYSIS
Sentiment analysis is one of the most common applications in natural language processing. With Sentiment analysis, we can decide what emotion a text is written. Here we are using the standford-corenlp for finding the users sentimental. The following outline is provided as an overview of and topical guide to natural language processing:

GIVES SUGGESTIONS

In that module if the user posted a three continuous negative post means it will gives the suggestion's. In that suggestions it will be shows the near by hospitals to the user.

4. Results and Discussions

Sucide Disease Frequency for Sex

Sucide Ideation Frequency for Ages
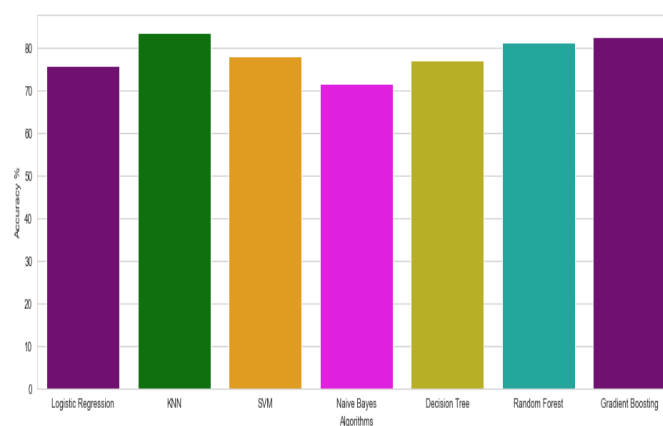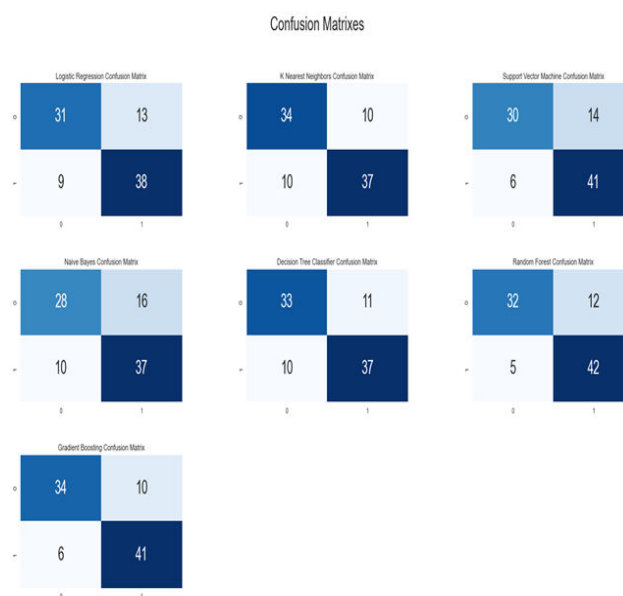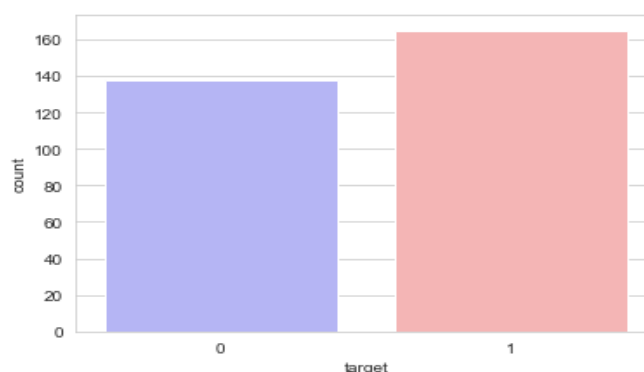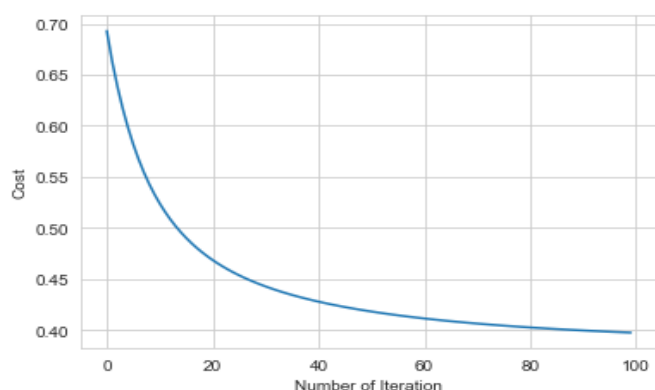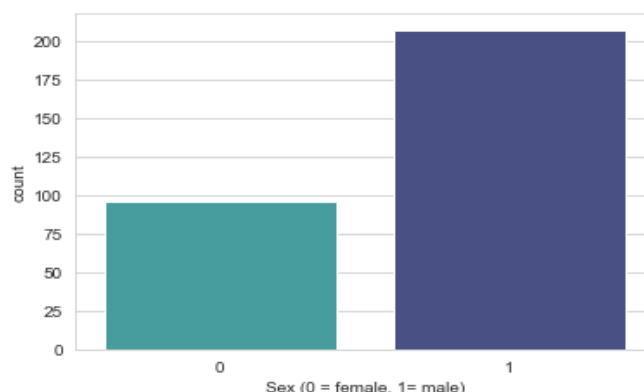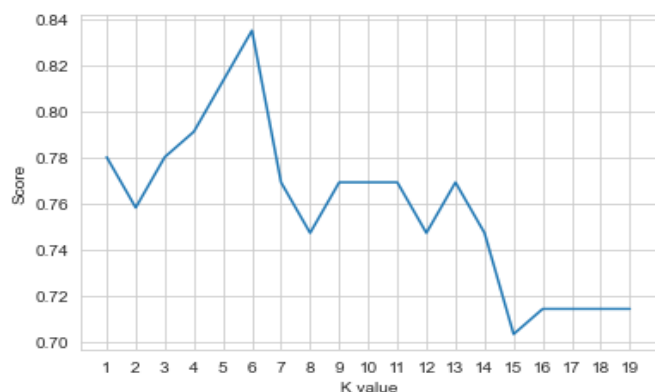
5. Conclusion

In this study, an efficient machine learning based diagnosis system has been developed for the prediction and detection of suicidal ideation. Machine learning classifiers include LR, SVM, NB, and GB is used in the designing of the system. Four standard feature selection algorithms including proposed a novel feature selection algorithm FCMIM used to solve feature selection problem the early prognosis of suicidal ideation can aid in making decisions on lifestyle changes in high risk patients and in turn reduce the complications, which can be a great milestone in the field of medicine. This project resolved the feature selection FCMIM behind the models and successfully predicts the suicidal ideation, with 85% accuracy.

FUTURE WORK

Further for its enhancement, we can train on models and predict the suicidal ideation and providing recommendations to the users, and also use more enhanced models.

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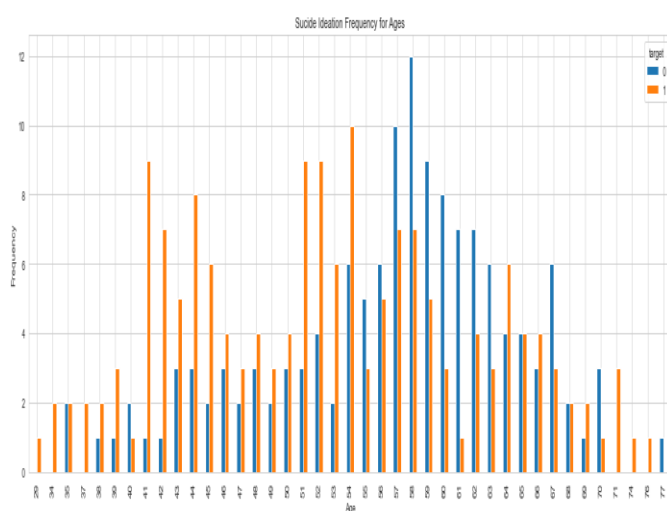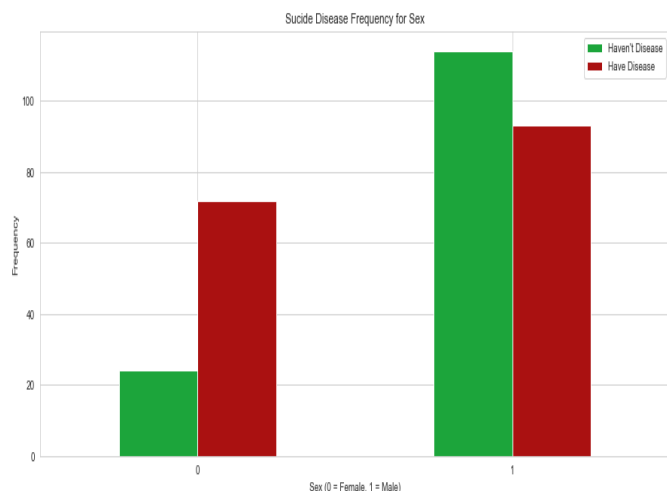
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