

A Real Time analysis and prediction of Mental Health Disorder based on Machine Learning Technique

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ABSTRACT

Mental health is the aggregation of emotional, social and psychological well-being of a person. It affects on the person's thinking, acting and feeling capability. Mental health is a measure of handling stress and decision making with every step in life. There is enough data available that we are now able to compile data for mental health professionals so they may do their job efficiently. Machine learning classification algorithms will help in determining key behavioural biomarkers to help mental state professionals choose if a patient is in peril of developing a selected mental state disorder. Algorithms may assist in tracking effectiveness and better of a treatment plan. This paper reviews about the appliance of ML to psychological state prediction, which incorporates a variety of advantages across the areas of diagnosis, treatment and support, research, and clinical administration. With the bulk of studies identified that specialize in the detection and diagnosis of psychological state conditions.

KEYWORDS: Machine learning, Appetite, Mental illness, Depression, Schizophrenia.

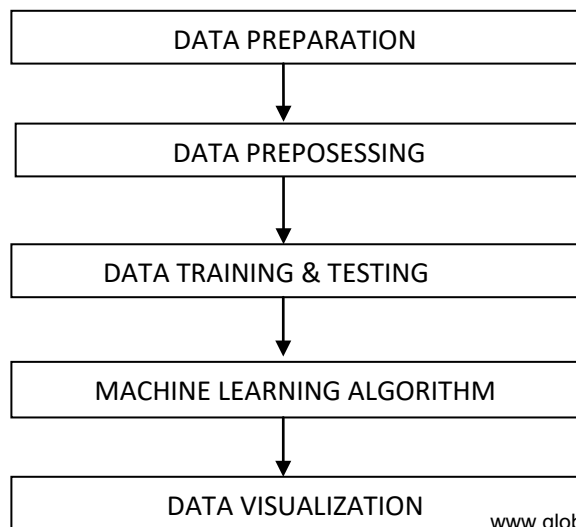
I. INTRODUCTION

Anxiety, Depression and Schizophrenia are the maximum not unusualplace sort of intellectual disorders. Anxiety is a intellectual fitness ailment characterized via way of means of emotions of worry, worry which can be robust sufficient to intervene with one's each day activities. Depression is characterized by the way of means of consistently depressed temper or lack of hobby in activities, inflicting widespread impairment in each day life. The continual feeling of unhappiness or lack of hobby that characterises main despair can result in quite a number behavioural change. Schizophrenia impacts someone's

capacity to think, experience and behave clearly. The specific reason of schizophrenia isn't always known, however a aggregate of genetics, surroundings and changed mind chemistry and shape might also additionally play a role. This intellectual fitness ailment might also additionally encompass adjustments in sleep, appetite, strength level, concentration, each day behaviour or self-esteem. These also can be related to mind of suicide.[6] Mental contamination is an final results of imbalances in mind chemistry. The assessment of intellectual well being is extraordinarily vital to apprehend and endorse remedies for sufferers with a deviated intellectual behaviour.

This look at hired 5 tiers as follows, (1) information enter process, (2) pre-processing information, (3) KNN set of rules type process ,Naive bayes and logistic regression (4) assessment of algorithms.Aim of this thesis is to expect whether or not someone could have intellectual contamination or now no longer on the premise in their symptoms. We have amassed information from actual time remarks with the assist of google form. The dataset specially includes information of operating people and pupil age between 20 to 35years.The data consists of string attributes which we later encoded to numeric attributes for better prediction. [2]It consists of 14 questions based on which our system will predict a specific mental illness that a person suffers from mainly (Anxiety , Depression or Schizophrenia).The dataset used is in generally textual form , the data then converted into machine language for further process. Data cleaning was done manually. Firstly, it removed attributes with a lot of missing values. The missing value was data with an unfilled survey. Data cleaning consisted of five processes, namely, (1) removing attributes with a lot of missing values, (2) removing irrelevant attributes (3) removing identical attribute.Data pre-processing - Standardization is an important technique that is mostly performed as a pre-processing step before many Machine Learning models, to standardize the range of features of input data set.We have applied machine learning algorithm to create a model.

Figure 1. shows the bock diagram of the implemented system. It illustrates the various modules and phases of the system



AUTHOR	ABSTRACT	METHODOLOGY	OUTCOME
Emmanuel ,Theodore ,PE pintelas	A review of machine learning prediction method for anxiety disorder	i)Naïve bayes& Bayesian network ii)ANN iii)SVM	i)95% accuracy ii)82.35% iii)78.5%
Sandhya P ,Mahekkant esaria	Prediction of mental disorder for employees in IT industry	i)Logistic regression ii)KNN iii)Decision tree iv)Random forest v)Bagging vi)Boosting vii)Neural network	79% 80.4% 80.6% 81.2% 77.7% 81.7% 81.4% Accuracy
Anu priya ,shruti garg ,nehaprenat igga	Predicting Anxiety, Depression and Stress in Modern Life using Mamchine Learning Algorithm	i)Decision tree ii)Random Forest ii)Naïve bayes iv)Support vector machine	Anxiety - 0.733 Depression - 0.778 Stress-0.628 Anxiety -0.714 Depression- 0.798 Stress -0.723 Anxiety - 0.733 Depression- 0.855 Stress- 0.742 Anxiety- 0.678 Depression 0.803 Stress 0.667
Devakunchari Ramalingam, Vaibhav Sharma, Priyanka Zar	Study of Depression Analysis using Machine Learning Technique	Logistic Regression (SLR), Multilayer Perceptron Neural Networks (MLPNN), Support Vector Machine (SVM), and Random Forest (RF).	The system using this achieved average detection accuracy of 82.2% in case of males and 70.5 in case of females

V shrinivasan reddy, adityavivek, a dharun.	Machine learning technique s for stress prediction in working employee s	Logistic Regression K-NN Decision Tree Random forest boosting	Boosting produced the highest accuracy
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Machine Learning algorithms:

Brief Introduction of the classifiers: - Naive Bayes:- This classifier belongs to the probabilistic group of classifiers in the domain of machine learning. The base of this classifier is the Bayes Theorem where the features are considered to be independent of each other. It is a very popular when it comes to classification. It is a simple model where the test (unknown) instances are assigned class tags based on the trained model. K-NN :- K-nearest neighbor model can be used as classification model or regression model. For an unclassified instance as the input we consider

the k classified instances in a constraint region and accordingly the unclassified instance is given a class whose instances are most in that region. In case K=1, the unclassified instance is given the class whose neighbour is nearest to it, there is no need for count as the value of k is 1.

SVM: - A Support Vector Machine (SVM) works by finding a hyper-plane that can efficiently divide the set of objects in different classes.SVM takes a labelled training data, and outputs is the hyper-plane which can then be used to categorize new input. A decision line separates different set of objects having memberships of different classes. A set of training examples is provided to the algorithm and it generates a boundary in order to differentiate between the classes learning from training examples

II. RELATED WORK

In [13] U. S. Reddy et al. have applied various algorithms to find the most accurate one and compared the relationship between various parameters in the dataset. In [14] M. P. Dooshima et al. have used different biological, psychological and environmental factors to predict mental health. Different psychiatrists experts were consulted to validate the obtained parameters. In [15] M. Srividya et al. have used 22. W. Zhang, X. Yang, S. Lui, Y. Meng, L. Yao, Y. Xiao, W. Deng, W. Zhang, and Q. Gong. 2015. Diagnostic prediction for social anxiety disorder via multivariate pattern analysis 25. Impact of COVID-19 and lockdown on mental health of children and adolescents: A narrative review with recommendations. In [7] S. G. Alonso et al. have conducted extensive review of different algorithms used for mental health prediction. Different techniques such as Association Rule Mining and Randomization were studied and their predictions were noted for our project. This paper also reviewed other algorithms such as SVM, Decision tree, KNN, ANN, Naïve Bayes.

There are different kinds of systems that currently exist. Most of them use different methodologies to predict mental illness. Some of the present systems includes an online response which predicts whether the person has mental illness or not.

III. IMPLEMENTED SYSTEM

Our aim in this thesis is to predict whether a person can have mental illness or not on the basis of their symptoms. we review the non-technical and technical studies dedicated to mental illness. Mental illness is an epidemic phenomenon and is generating severe harm to people, especially adults. The thesis deals with the kinds of mental illness, several work has been done in this field and also the

background studies that are important for

PREDICTION	precision	recall	f1-score
NOMENTALDISEASE	0.77	1.00	0.87
MENTAL DISEASE	1.00	0.73	0.84

performing the analysis. Though there is barely any work trying to predict schizophrenia taking into consideration all these features, we have tried to implementsuch an all in one model here that will take care of all these aspects of mental illness.It illustrates the methodology proposed by us. We have gathered the data from different sites and perform the process of data acquisition and feature extraction. After the preprocessing of the data, we have them labeled as 0 (no mental illness) and 1(mental illness) . The proposed method which we have used as three classification algorithm KNN ,Naive bayes and Logistic regression The chapter also introduces the involve features like color histogram for data visualization.

Here we have explained the setting of various parameters that has been used for performing the experiments. We have defined the proper distribution of the data as in what proportion the modalities are used in our model. Further we have analyzed our model individually for each type of modality and analyzed the results. The results are also compared by using classification algorithms like Logistic regression and KNN and observed that these two gives the best results. the accuracy we have received is 96%, which is the improvement over past research.

IV. RESULTS AND ANALYSIS

Classification using Logistic regression, naive bayes and the KNN method was carried out with different values of k. it was done to obtain the optimal k value with the best accuracy. We have used three evaluation metrics: Precision, Recall, Accuracy.

Precision: It is the ratio of data elements that are correctly classified (for both the minority and majority class) to total number of classified instances' =TP/ (TP + FP)

Table 1 Representation of Naive bayes

Recall: The ratio of the minority class instances that are correctly classified to the total number of actual minority class instances. R =TP/ (TP + FN).

F-Measure: Precision and Recall are used for performing the calculation of Fmeasure. It is calculated by taking the harmonic mean

PREDICTION	precision	recall	f1-score
NOMENTALDISEASE	0.91	0.94	0.93
MENTAL DISEASE	0.95	0.91	0.93

Table2 - Representation of Logistic Regression

of Precision & Recall. We can say that it is essentially an average between the two percentages. It really simplifies the comparison between the classifiers.
 $F\text{-measure} = 2 / (1/R + 1/P)$.

Table3 - Representation of KNN

PREDICTION	precision	recall	f1-score
NOMENTALDISEASE	0.91	0.92	0.96
MENTAL DISEASE	0.93	1.00	0.96

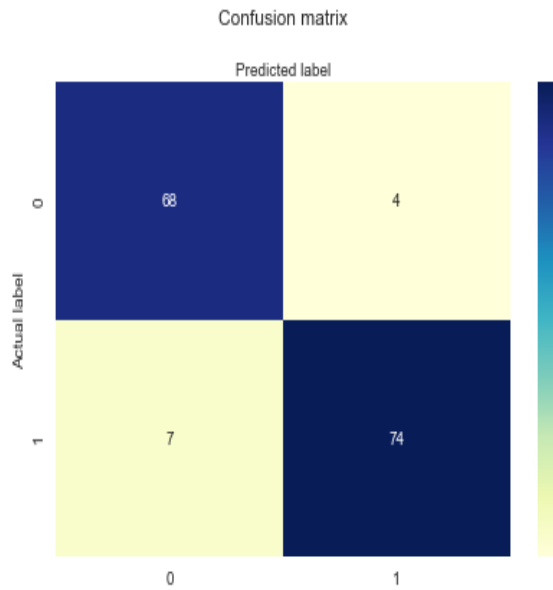


Fig 3 Confusion matrix of Logistic regression

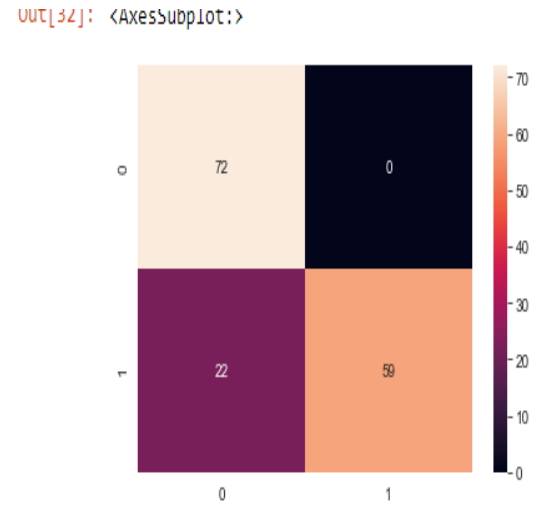


Fig 5 Confusion matrix of Naive bayes

Figures show the confusion matrix denoting the accuracy of the algorithm.

$$\text{Accuracy} = \frac{TP+TN}{TP+TN+FP+FN}$$

Using the values in figures, we get the accuracy of the KNN algorithm as 0.96, Logistic regression, 0.92 and Naive bayes 0.85.

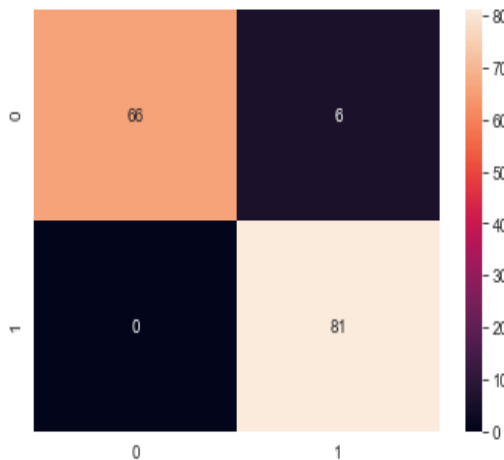


Fig 4 Confusion matrix of KNN

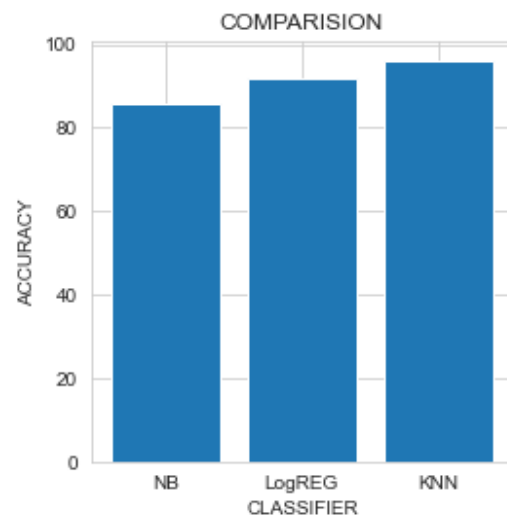


Fig 6 Comparison

V. CONCLUSION

As in step with the have a look at through WHO, melancholy can be a main purpose of intellectual infection withinside the global and those want to take greater care approximately their intellectual wellbeing for a balanced social and expert life. People who're suffering to technique human beings for analysis can cross for the net predictors. People who are hesitant to approach humans for diagnosis can make use of online predictors for results.

To do the prediction, we have encoded the data first We have then used the KNN and logistic regression algorithm and trained a model . The accuracy we received with both the algorithm was 96% and 92%.To sum up, this research obtained 70% of training data and 30% testing data which resulted higher value of precision, recall, and accuracy compared to other data composition.

VI. FUTURE SCOPE

In the future, we can create a system which predict a specific mental illness formulating a scoring system for different attributes based on their importance to create a uniform scale to measure the levels of particular disease one can have ,so that the person can diagnosed earlier , however extensive data collection needs to be carried out for it. Additional methods can be used to test the efficiency of the model.

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