Mental Health Tracker For User's Well-Being Using Machine Learning Techniques

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ABSTRACT

This paper highlights the significance of digital transformation particularly in the sphere of mental health care. Mental health influences how one feels and behaves. Bad mental health can lead to depression. Its early detection enables doctors to diagnose them more effectively. This study is to develop an application to track an individual's mental health. Several accuracy criteria were used to assess the efficacy of four machine learning techniques in this study's diagnosis of mental health issues. KNN Classifier, Decision Tree Classifier, Logistic Regression, and SVM are the four Machine Learning algorithms. We compared these methods, put them into practice, and found the most accurate method.

Based on these patterns, the tracker provides personalized recommendations for interventions that may help manage mental health conditions. Our evaluation results demonstrate the effectiveness of the mental health tracker in improving user well-being and suggest that it could be a useful tool for improving access to mental health care. Additionally, the mental health tracker has the potential to enhance the efficiency of mental health care by streamlining the process of identifying and addressing mental health concerns. It may also reduce the stigma associated with seeking help for mental health issues by providing a confidential and convenient way to track and manage mental health.

Keywords:- *Machine Learning; Mental Health; Accuracy; Machine Learning Algorithms; Supervised Learning; Depression; Mental Health Illness Prediction.*

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1. INTRODUCTION

The rise in mental health issues and the demand for high-quality medical care has prompted research into the use of machine learning in mental health issues. The working class and students are among those who are impacted by mental health issues. Monitoring the mental health profiles of various groups is crucial to anticipate any health-related anomalies. It's quite obvious that the specialists are regrettably frequently more engaged with the immediate difficulties of those who have a condition than those who are mentally unwell. Most of the time they are unfamiliar with the theories and methods of promoting mental health.

Mental health issues consequently go unrecognized or neglected. Depression, Anxiety disorders, bipolar disorder are some of the main mental health illnesses. They frequently take time to develop and have early-stage symptoms. Economic hardship is a pervasive and frequently immeasurable symptom that feeds a vicious cycle of illness and poverty. Advancements in technologies have helped reach all the classes. The ability to analyze these data with machine learning has grown. Smartphones, media platforms, neuroscience, and digital technology have made it possible for medical professionals and mental health researchers to obtain a ton of data quickly. We can now access specific forecasts in a way that we previously couldn't, thanks to machine learning. Determining important behaviors of the user to decide upon the status of his mental health could be assisted by machine learning algorithms. This paper provides an overview of an application implementing machine learning algorithms to track the user's mental health.

2. LITERATURE REVIEW

The strategies suggested by many studies are discussed here.
Norah Saleh Alghamdi, et al [1] intends to research the utilization of a text-analysis tool in an intelligent application to promote mental wellness. It employs several technologies that are integrated into smart gadgets and camera sensors to detect anxiety and depression. They experimented with various machine learning classifications, and the SVM they chose performed the best, scoring 79.81% on the text analysis tool.

Yash Jain, et al [2] proposes a complete healthcare management system that considers both physical and mental health. The Arduino UNO and the IOT sensor network are used and the article also includes an emotion identification unit to keep track of the person's emotions. After training CNN an accuracy of 66% was acquired by the emotion recognition system.

Piyush Kumar, et al[3] was restricted to foretelling mental illness in humans and characterizing the patient's perspective using the previously recorded dataset. They have employed Logistic Regression, KNN, SVM in Ensemble model 1 giving accuracy rate of 89.603% and Decision Tree, Naïve Bayes, SVM in Ensemble model 2 giving accuracy rate of 87.539%.

Ahmad Rauf Subhani, et al[4]. The main contribution of this research is the development of an experimental paradigm for successfully inducing stress at various levels as well as the provision of a framework combining EEG data analysis for stress detection at various levels. The recommended framework effectively identified stress with a maximum accuracy of 94.6% between two degrees of stress and the control and 83.43% between stress and the other levels of stress. The results suggest that stress levels may be precisely determined by EEG signals.

Ruyi Wang, et al[5]'s article suggests using a chatbot to monitor and evaluate the mental health of pregnant women. It uses an SVM algorithm to train a model to calculate the anxiety, depression, and hypomania index of perinatal women by analyzing the 31 characteristics of 223 samples using supervised machine learning.

Vaishnavi N Jadhav, et al[6] suggests a system design based on the Android app "Mental Health Tracker," which detects a user's mental health. The application incorporates an authentication method to ensure data protection. The system uses Neural Processing Language (Textblob), Machine Learning (algorithm random forest), and MySQL for sentiment analysis.

Apoorva Bagul, et al[7] their project's goal is to create a mental health tracker to gain an understanding of the user's emotional state, find out whether they are suffering, and then propose steps they may take to get out of their current situation. A user answers certain questions and depending on their responses, it recommends activities to them and keeps a record of their mental state for display on a dashboard.

Braden Tabisula, et al[8] proposes a smartphone application that users can download. The user shouldn't squander time pondering their current strategy while under stress, worry, or sadness. Instead, the app can start the process for a speedier and more efficient resolution to their symptom after asking a few questions to assess the individual.

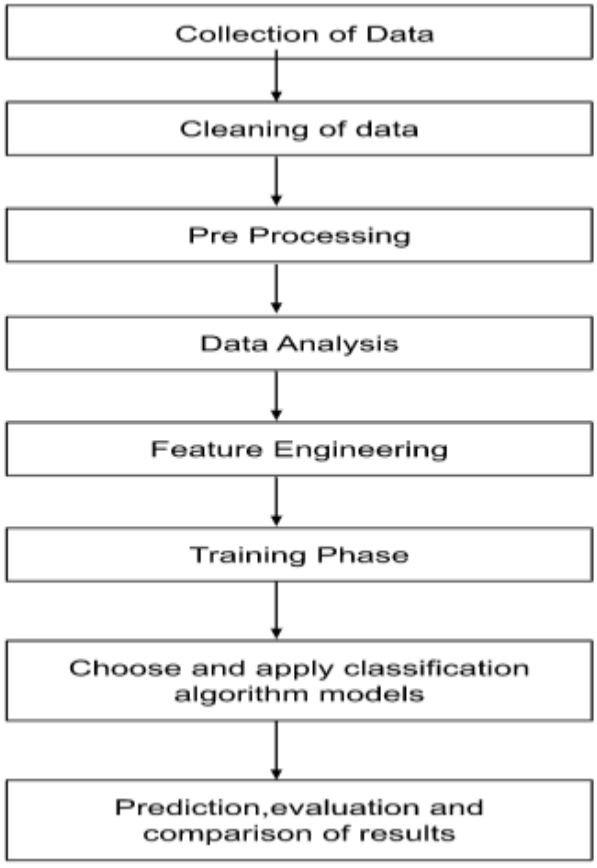
Philip Moore, et al[9]. In order to effectively monitor patients with mental problems in Smart-Psychiatric Intensive Care Units and the community, this study examines the practical difficulties that must be overcome . It was concluded that all parties involved in the treatment of mental diseases will profit from efficient patient monitoring.

Jetli Chung, et al[10] summarizes the findings of a recent in-depth analysis of machine learning algorithms for identifying mental health issues in this paper. The systematic review was carried out utilizing the PRISMA methodology. It takes into account the challenges and limitations that machine learning researchers in the field of mental health face. They also provided detailed suggestions for further research.

3. METHODOLOGY

Data collection, cleaning of data, pre processing, data analysis, feature engineering, training phase, testing and evaluation models
finding accuracy through four machine learning methods, prediction results are all part of the knowledge discovery from the data process as explained below:

1. Collection of datasets from the data source, analyse the data and then conduct data processing.
2. Finding incomplete, inaccurate or absent data and then altering, substituting, or erasing them in accordance with the specified requirement is the data cleaning phase.
3. Plot graphs for data visualization and analysis using matplot lib or pyplots.
4. Data encoding is a part of feature engineering. It is used when the explicit attribute is designated as ordinal. During label encoding, each label is converted into an integer value.
5. Another process in feature engineering is that the dataset is divided into a training and a testing data set. Select best features that is inputs for better prediction.
6. Before the training phase we choose the machine learning models and then fit the models, predict with inputs.
7. Our aim is to predict mental health illness, for prediction supervised learning is the best methodology. Several supervised machine learning techniques, including Linear regression, KNN classifier, Support Vector Machine and Decision Tree classifier are used to evaluate the models.



a) Flow Chart

And finally we evaluate the four machine learning models and find the accuracy along with the classification report. Integrate the machine learning models with stream-lit web framework for better user interface and experience.The ability of a classifier to accurately classify the test data set will determine how accurate the classifier is. The accuracy of each of the four techniques is evaluated and compared to find out the most accurate algorithm.

a) Linear regression (LR)

One of the simplest and statistical techniques for performing predictive analysis. It makes predictions for continuous/real/numeric variables. It may be used to determine how the dependent variable's value changes as a function of the independent variable's value.

b) KNN Classifier (KNN)

It is a non-parametric supervised learning algorithm that is used for dataset classification and regression. We must repeatedly undo the code in order to choose the K value that minimizes error and enables the algorithm to anticipate results with accuracy.

c) Support Vector Machine (SVM)

A deep learning technique known as a support vector machine (SVM) carries out supervised learning for data group classification or regression.

d) Decision Tree Classifier(DT)

It is the most popular supervised machine learning method used in data mining. Using a decision tree is a visual representation of a statistical probability or the sequence of occurrences, acts, or outcomes.

4. SUMMARY ON LITERATURE SURVEY

Author	**Technique**	**Description**
Sinisa Colic, et al.[11]	Variable reduction/Random Forest algorithm	An accuracy of above 84.4% for SI prediction with 25 variables, and 81% with as few as 10 variables is achieved.
Shailesh Hinduja, et al.[12]	SVM, LSTM algorithms	Deep learning methods like LSTM found better results.
Rohizah Abd Rahman, et al.[13]	SVM, NB, LR, RF, DT Classifier algorithms	OSNs have great potential for identifying mental health issues but cannot ever fully replace more con- -ventional techniques like SVM.
Pradeep Kumar Tiwari, et al.[14]	DT, KNN Classifier, SVM, RF, NB algorithms	Decision Tree gives the most accuracy 92.8% when compared to KNN Classifier, SVM, Random Forest and Naïve Bayes.
V. Uday Kumar, et al.[15]	SVM, DT, RF algorithm	Random Forest obtains the highest accuracy, which is around 87%
Nirmal Varghese Babu, et al.[16]	DT Classifier, KNN Classifier, SVM, RF, NB, CNN, LSTM algorithm	On the depression datasets, combining CNN and LSTM algorithms increased precision.
Ivan Rodrigues, et al.[17]	Set of Complex Event Analysis rules	Context-based recognition offers a superior comprehension of social routine.
Luay Fraiwan,et al.[18]	Wireless multi sensor glove, Cloud &UI	Applied successfully in a variety of disciplines where physiological measurements are used.

Oladapo Oyebode, et al.[19]	SVM, MNB, SGD, LR, RF algorithms	SGD came in first overall with an F1 score of 89.42%, and SVM was close behind. Additionally, for negative reviews, SGD attained good precision and recall of 89% and 90.6%, respectively.
Saad Awadh Alanazi, et al.[20]	SLCNN, SVM, AdaBoost	SLCNN is regarded as the best classification technique because it has an accuracy rate of 83.4%, compared to 57.2% and 66.4% for SVM and AdaBoost, respectively.

5. CONCLUSION

The project's goal is to classify a dataset of different mental health issues using four distinct Machine Learning Algorithms for predicting mental disease. Based on the user inputs the tracker is supposed to decide the psychological stability of the user and using those four machine learning techniques, it is feasible to conclude that they produce more accurate results. . All of the classifiers' accuracy is predicted to be more than 78%.

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