AI Mental Health Tracker And Analyzer Using Machine Learning

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Abstract: Mental health problems are one of the major concerns of the 21st century in the field of healthcare. One of the major reasons behind this problem is lack of awareness among masses. The increase of mental health problems and the need for effective medical health care have led to an investigation of machine learning that can be applied in mental health problems. Early detection of mental health issues allows specialists to treat them more effectively and it improves patient’s quality of life. Mental health is very important at every stage of life, from childhood and adolescence through adulthood. This study amalgamates insights from diverse research endeavors to present a comprehensive systematic review of machine learning (ML) applications in the mental health domain. In this research paper techniques like Logistic Regression, K-NN, Decision Trees, Random Forest, and Support Vector were compared, with Random Forest proving most accurate at 73.16% prediction accuracy.

Keywords: Mental health, Anxiety, Depression, NLP, Machine Learning, Prediction, Text Processing, Mobile Application

INTRODUCTION

Mental health is a state of internal well-being that enables people to manage with the stresses of life, realize their capacities, learn well and work well, and contribute to their community. Prolonged isolation and uncertainty during the pandemic has increased stress and anxiety for many people. Financial problems, unemployment and social restrictions worsen mental health problems. Unfortunately, fear of judgment prevents people from seeking help, causing some to turn to drug addiction as a solution. Breaking the stigma surrounding mental health is important to encourage open discussion and provide support to those who need it.

According to WHO internal health is “further than the absence of internal diseases.” Peak internal health is about managing active conditions and maintaining heartiness and happiness. According to government statistical data out of the whole population of India, 130 million people could be suffering from some kind of internal illness.
A large quantum of India’s population is living below the poverty line, these people don’t have access to proper sanitarium, food, water, drug, etc. For them proper treatment of internal illness is still a distant dream. Indeed for the top 10 percent of the population, treatment is expensive. According to world health association data India has 0.75 psychologist and psychiatrist per 100,000 people, when compared to Argentina which is a world top leader in this has 106 psychologists per 100,000 people. To overcome this implicit epidemic of internal illness, the government has to take some strong and necessary way towards healthcare, furnishing a sufficient budget towards internal health. The main reason behind such a huge number of people suffering from internal illness is our atrophied healthcare system. Anxiety and depression are serious public health issues that affect people each over the world. They affect people of all periods, from children to the senior, including both men and women.

Machine literacy is a fashion that aims to construct systems that can ameliorate through experience by using advanced statistical and probabilistic ways. It's believed to be a significantly useful tool to help in prognosticating internal health. In this paper, the main ideal is to give a methodical literature review, critical review, and summary of the machine literacy ways that are being used to prognosticate, diagnose, and identify internal health problems. Some of the major internal health diseases, similar as habitual conditions, bipolar complaint, and schizophrenia they don’t suddenly arise out of nowhere; they frequently develop over time and produce symptoms that can be honored in the early stages similar diseases could be avoided or controlled more successfully. If abnormal internal countries are discovered beforehand in the complaint’s course when redundant treatment and care can be handed. Technological advancements similar as smartphones, social media, neuroimaging, and wearables have enabled experimenters of internal health and croakers to gather a tremendous quantum of information at a rapid-fire rate. Machine literacy has developed as a dependable tool for assaying these of all Classifiers more fluently and rightly discovered, as well as more accurate prognostications from data sources. Natural language processing, speech recognition, computer vision, and Artificial intelligence have all served from machine literacy, which allows inventors and experimenters to prize pivotal data from datasets, deliver substantiated gests, and develop intelligent systems. In disciplines like bioinformatics, ML has backed substantial progress by allowing for quick and scalable analysis of complicated data.
In this review paper, we want to give a summary of the rearmost exploration on machine learning approaches in prognosticating internal health problems, which can give useful information to the clinical practice. Besides that, this review paper also will identify the types of machine learning algorithms that have been extensively used for this field. We also want to learn and probe the limitations of the operation of machine learning within this field. Also, we want to determine the unborn openings or exploration avenues that can maximize the eventuality of machine learning approaches within the mental health fields.

<table>
<thead>
<tr>
<th>Methods</th>
<th>Accuracy(%)</th>
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<tbody>
<tr>
<td>Logistic Regression</td>
<td>70.28</td>
</tr>
<tr>
<td>K-Neighbors Classifier</td>
<td>65.17</td>
</tr>
<tr>
<td>Decision Tree Classifier</td>
<td>69.67</td>
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<tr>
<td>Random Forest Classifier</td>
<td>73.16</td>
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METHODOLOGY

Insure the stylish possible working of machine learning algorithms it needs to work with some crucial parameters. Each and every task requires a different model grounded on the type of data and work is being dealt with. Hence, it's pivotal to acclimate the model’s parameters to increase its mileage and delicacy. In our work we've tried to insure to tune all the models with acceptable parameter values and rotund for the foremost value for our model.
We've proposed an idea in which we collected datasets and pre reused the data for our design and counterplotted the data into graphs to check the quality of the data also train the data with different algorithms to prognosticate the affair with advanced delicacy.

MOTIVATION OF THE PROJECT

The driving force behind this project is to create a phone that can track mental health. The goal is to determine the user's mood, identify potential problems, and provide personalized suggestions for improvement. By answering targeted questions and participating in recommended activities, users can track their progress and gain insight into their health from a dashboard. The app aims to empower people to control their thoughts, feelings and emotions by providing simple solutions to mental health problems based on the principles of mindfulness behavior therapy (CBT).

PROPOSED SYSTEM

The main compass of our design is to describe mental health vaticination and to design a bracket model with the help of a machine learning algorithm.

Data Pre-manipulation

This particular scrap of the report will graft the data, and examine the standard of data and also trim and clean the given dataset for analysis.

Data Graphing

The data set collected for prognosticating given data is resolve into the training set and a testing set. Generally, 73 rates are applied to split the Training set and Test set. The Data Model which was created using machine literacy algorithms is applied to the Training set and grounded on the test affect delicacy. Then matplotlib is used for data visualization.

Designing the classification model

Classification is a supervised machine learning fashion that group records into sets of homologous compliances associated with particular classes. Different classifiers or bracket algorithms are available. In this study, six different classifiers were trained, including k-nearest neighbor, naive Bayes, random forest, decision tree, logistic regression.

1- Logistic Regression algorithm

It's a classification algorithm in the fashion of machine learning which is used to describe the possibilities of a categorical dependent variable. The purpose of logistic retrogression is to find the exact model to unfold the association between the bifurcate specific of interest (measured variable = reply or final output variable) and a set of variables.

2- Decision Tree Classifier algorithm

Decision-tree algorithm is one of the most effective order and well-familiar order of supervised learning algorithms. It's suitable for nonstop and categorial variables of the affair. Decision tree constructs classification or regression models and assembles it in a conformation of a tree. It breaks down the sets of data into inferior and inferior subsets while coincidently anco-related decision tree is incrementally designed. A root knot has two or further branches and a splint knot which represents a classification or a categorial decision. It's designed in a top-down recursive approach and in a peak and conquer manner. i.e., 80 percent of it goes for training the model and the rest 20 percent is used to test the delicacy of the model. Through exploration we've named the following machine learning algorithms to find the stylish possible algorithm that could give us the most delicacy.

3- Random Forest Algorithm

It's an algorithm that comes under supervised form of learning. The working principle is to produce multiple decision trees and all of them are combined to get precise prognostications. Hence, it's considered a popular machine learning algorithm.
4- Decision tree Algorithm

A decision tree comes under supervised learning algorithms where data is continuously resolve according to the parameter. The tree consists of two effects i.e., decision bumps and leaves. Decision knot is the stage where data is resolve and all the choices made are the leaves.

5- K- nearest neighbor Algorithm

Also known as a lazy or non parametric algorithm. The algorithm is actually grounded on point similarity. The vaticination is done according to the computation of the nearest data points. As it stores all of the training data, it can be computationally precious when working on a large dataset.

6- Naive Bayes Algorithm

It's a classifier which is grounded upon tentative probability models. These classifiers are a set of classification algorithms that are grounded on Bayes Theorem. It’s a group of algorithms where a common principle is participated between them be categorical.

The Naive Bayes algorithm is an intuitive system that uses the chances of each trait belonging to each class to make a vaticination. Naive bayes simplifies the computation of chances by assuming that the probability of each trait belonging to a given class value is independent of all other attributes.

Experimental Analysis

1) Dataset used

Our analysis leveraged a self-reported survey dataset. This survey gathered data from a group of participants through a series of questions. The questions explored various aspects of their lives that might influence mental health, including family environment, family history of mental illness, employment status, workplace environment and culture, and coworker behavior.

2) Data cleaning

Our personal survey data is rigorously reviewed to ensure its quality. We addressed missing values by interpolating the data, including the mean (for skewed data) and modulated categorical data (most values). Inconsistencies such as irregular gender entries (“male,” “not male”) are normalized within a single type (male, female, transgender). We remove unimportant attributes such as address, date of birth and carefully check whether the item can be removed or a profit can be made (limited to very valuable items). Finally, system-specific scaling or normalization techniques are applied to ensure that all features are on par with machine learning metrics. This cleaning process prepares the data for the development of a good, comprehensive model.
3) Heatmap

4) Distribution Plot
5) Feature Selection

Feature selection is the process of identifying and selecting the most important features from a dataset to improve model performance. It aims to reduce the difficulties caused by the potentially negative dimension. The best techniques for selection include correlation analysis, feature extraction, and content analysis. In our model, we use special options to simplify the data size and focus on specific features that contribute to good model accuracy and performance.

WORKFLOW

In this application, we will first provide an introductory guide on how to use the application when the login page appears. If the user is not logged in, the user can register. The user will then be asked some questions. Identify the current brain and current thought according to the response from the user and present the results to the user. Users can see their mental health through graphs. According to the report, users will be taught various activities to improve their mental health. Finally, the app provides contact information for some psychiatrists. If the user needs the help of a psychologist then he can seek help from a psychologist. This application is a user-friendly application. The user interface of this application is user-friendly and its functioning is understandable to the users. The app provides a complete understanding of the mental state of the user using some questions asked in the app and the user has to answer these questions. In this way, we can predict the health status of customers and offer activities that will improve their health.
CONCLUSION

Mental health is a subtle but important part of our lives; it affects our thoughts, actions, and emotions. It directly affects our productivity and performance in both personal and professional areas. Depression is thought to be the leading cause of mental illness worldwide, according to the World Health Organization. This highlights that people need to prioritize their mental health to live a fulfilling life.

Many people who are aware of the importance of mental health seek support but may be reluctant to seek professional diagnosis for a variety of reasons. To bridge this gap, new solutions like Mental Health Tracker offer an effective and easy-to-use method of mental health care. The utility allows users to understand their thoughts and experiences through a variety of questions. The system creates jobs and activities in line with the user's requests based on their answers. Additionally, the app provides users with better information about their health by providing weekly graphs where they can track their mental health.

Thanks to computer technology, these machines can detect signs of depression and offer personalized advice to patients. It improves mood and overall health. Work with mental health professionals to ensure these solutions are effective and meet users' needs. Finally, empowering people to understand and protect their own health is crucial to creating a healthy and prosperous society in a competitive world.
FUTURE SCOPE

The current focus on one form of machine learning data for brain diagnosis provides an important framework. However, future research may improve accuracy by combining multiple devices. By analyzing things like speech patterns and facial expressions or EEG data and social analysis, researchers can gain a deeper understanding of a person's emotional state. This will require not only the development of new models that can integrate these models, but also the creation of specialized information systems designed for audiovisual analysis in mental health research. By overcoming these challenges, researchers can develop better and more accurate models, paving the way for earlier interventions, better treatments, and ultimately supporting better mental health.

REFERENCES

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