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Implementation of Machine Learning Techniques to Monitor Mental Health

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ABSTRACT: Mental health reflects a person's emotional, psychological, and social well-being. A report by World Health Organization suggests that India is the most depressed country in the world. Hence, the idea is to develop an end-to-end solution for identifying and treating mental- health issues. This project aims to develop an application to keep track of user's behavior, both online and offline, to understand and identify the possible mental health issues using various analytical and psychological methodologies. The system uses Neural Processing Language (Text blob), Machine Learning (algorithm random forest), and MySQL for sentiment analysis, questions must be shuffled. The target users of this application would be the individuals just above the age of 18 which fall under the category of working class. Hence, our android application will take the necessary steps to accurately identify and treat the mental health issue. A graph will be generated based on the answers, and you will see a graph of the weekly improvement. Using this application can help a person overcome their mental illness in order to live a happier life by suggesting some tasks or activities that they can do to accomplish their goals.

KEYWORDS: Anxiety, Depression, Android Application, Prediction, Sentiment Analysis, NLP, Machine Learning, Classification, Mental Health.

I.INTRODUCTION

In our daily life, mental health is need of life. Mental health means a state of mind in which the person understands his/her own abilities and disabilities, but mental health will be metal illness, and it can affect our whole life. Researchers are increasingly emphasizing the importance of mental health awareness as many college students suffer from mental health issues and these challenges affect their lives and their academic performance. Unfortunately, many colleges students report having mental health concerns, and only about one-third of students with psychological disorders receive mental health treatment. Therefore, an effective and user-friendly app is in need of hour. We applied a sentiment analysis strategy in this project's model. The sentiment analysis method aids in determining the user's sentiment. Sentiment analysis, as the name suggests, uses words or reviews to assess the user's sentiments and emotions. It focuses mostly on text data sentiment analysis. A producer known as NLP is required to understand human language by a machine. NLP enables humans to speak in their native tongue while simultaneously making computer comprehensible. Sentiment analysis is a branch of natural language processing that uses machine learning approaches to uncover precise insights. The random forest classifier will be utilized in this model, which is a machine learning method.

We also did some research with help of previous years IEEE papers and came to know that were some cons/disadvantages that were mentioned in IEEE papers that we came across.

Following are the key points of this application
1) Self-Monitoring
2) Chatbot Assistance
3) Notifications andReminders
4) Dashboard
5) Motivational Quotes
6) Recommend Activities and Brain Games
7) Video Consultancy with a Therapist/Psychiatrist

8) Feedback and Enquiry
9) Privacy and Confidentiality

II.LITERATURE SURVEY

In many previous papers, we observed different systems and methods. We found some analysis based on those papers. We found some scope, advantages, and disadvantages. There are different kinds of systems that currently exist. Most of them use different methodologies to predict mental illness. Some current system include an online survey which predicts whether the user has mental illness or not. These surveys are illness specific, i.e., a different survey for depression, a different one for stress and soon.

A. Literature Review

According to our research we found that India is in the top among many countries which are worst hit by depression.
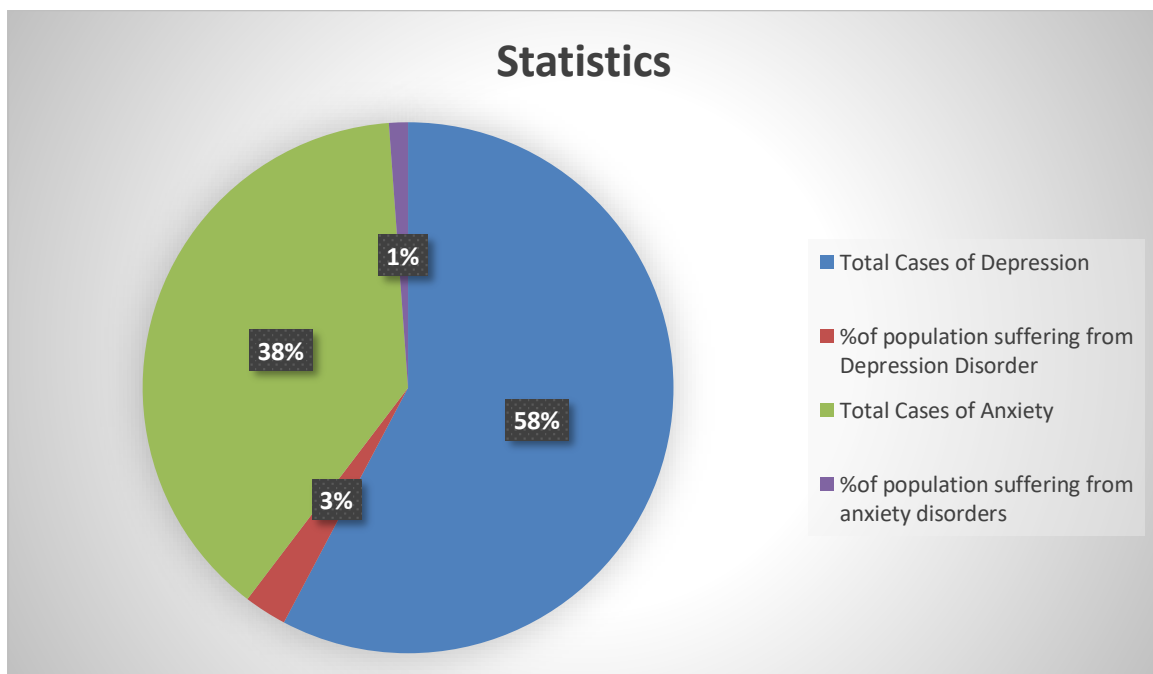
The statistics says that Global attitude surveys may rank Indians among the most optimistic in the world but suicide deaths in the country tell a different and more depressing story. Suicide rates in India are among the highest in the world, according to a new World Health Organization (WHO) database of global suicide deaths. The only suicides that have attracted attention in India over the past few years have been those by farmers but as the accompanying charts show, farmer suicides are no longer the drivers of the high suicide rate in the country. In fact, suicide rates among farmers are lower than the national average, according to data from the National Crime Records Bureau (NCRB). Some analysts say the drop-in farmer suicide rate over the past few years is because of under-reporting of numbers. But farmer suicide rates in the country are lower than that of non-farmers even after adjusting for discrepancies in reporting by states such as Chhattisgarh, Mint's analysis shows. The upshot: We need to start viewing suicides as a generic public health problem. The charts highlight the trends in suicide rates, and the areas where they are the highest.

This model aims to identify, analyze and characterize the current state of person by mood tracker,Chatbot, test was provided. Python and machine learning technology was used for this model. In recent years, mobile devices have been used in the mental health domain as part of the medical, psychological, and general health services to help the mental disorders treatment and monitoring. Mobile technologies not only allow the continued monitoring of the individual's physiological state, but also contribute to building a lifetime record of psychological, mental, and social health. Hence, the use of those technologies in health assessments and interventions can be used to reduce healthcare costs, while improving the access to health services. In this paper, we described a systematic review on what and how 216 current mobile

applications are providing resources for depression assistance. We decided to apply guidelines of software engineering systematic literature review to define a unique and adequate process for conducting the applications review. In this investigation, the main goal was to provide a characterization of those apps, identifying and discussing them by considering important features. Main findings highlight growth in the apps' purposes and functionalities, suggesting that apps are seeking to achieve users' requirements, but not always taking into account the need for face-to-face meetings with mental health professionals. As a result, the findings of this study can be an opportunity to propose solutions considering and encouraging the presence of qualified professionals in the process of treatment and monitoring. Further research efforts are needed to explore new possibilities to identify potential users who demand mental health services and to keep them in touch with the right professionals.[1]

In this paper, they proposed a novel methodology for detecting the mental condition of the user through various AI and ML technologies.Mental health is an important public health concern worldwide and should be a prominent part of the healthcare industry. However, the pace of development in this field appears to be quite slow. Recently AI techniques have attracted a lot of attention in different industries, including mental health. With the help of advanced AI techniques and machine learning algorithms, a personalized care that focuses on providing emotional support catered to a specific individual has been facilitated. In this paper, we analysis various systems for mental health monitoring namely virtual counselling, precision therapy, and diagnostic systems by reviewing the algorithms and parameters used in each system. We conclude by proposing a system which combines the above-mentioned systems and is planned to provide personalized mental care.[2]

In this paper we reviewed the use of smartphones in sleep research in mood, anxiety, and psychotic disorder patients. We conclude with two main observations related to the current state of the field. First, we found limited research in the form of published papers on this topic, perhaps due to the novelty of the topic and approach. While there are a larger number of studies reporting smartphone-based sleep monitoring in general patient populations, there are very few studies of digital sleep monitoring and intervention among individuals diagnosed with psychiatric disorders. Given the strong link between sleep quality and mental health symptoms, this is an important area for future investigation. Second, as this field continues to advance rapidly, we anticipate that many more studies in the future will make use of this approach. It is likely that there are currently many more studies in progress that were not captured in our review. Importantly, while most of the studies in our review were pilot studies, the findings highlight the feasibility and acceptability of using smartphones for subjective assessment and objective monitoring of sleep among individuals with depression, anxiety, and psychotic disorders. At present, smartphone technologies do not appear to offer the quality or depth of sleep data compared to PSG, though it is plausible that as the technology and methods improve, new possibilities for detecting sleep problems in individuals with psychiatric disorders will emerge. Smartphones are ubiquitous and they offer a simple and practical tool that may offer clinical value and utility. The early findings summarized here are promising and emphasize this as an important area worthy of further exploration.[3]

In this paper, machine learning algorithms were applied to determine five different severity levels of anxiety, depression and stress. Data were collected using a standard questionnaire measuring the common symptoms of anxiety, depression and stress (DASS-21). Subsequently, five different classification techniques were applied –Decision Tree (DT), Random Forest Tree (RFT), Naïve Bayes, Support Vector Machine (SVM) and K- Nearest Neighbor (KNN). The accuracy of naïve Bayes was found to be the highest, although Random Forest was identified as the best model. Due to the fact that this problem produced imbalanced classes, the best-model selection was made on the basis of the f1 score, which is used for cases of imbalanced partitioning.
The important variables were found to be 'scared_without_any_good_reason' 'Life_was_meaningless' and 'Difficult_to_relax' for the scales of Anxiety, Depression and Stress, respectively. As such, these variables were considered to be most important in detecting psychological disorder.[4]

III.OBJECTIVES

The Mental Health app will be created with an intention to identify and help a user during his mental illness. The proposed system is based on a android application which tries to ease up the process of finding the best solution for the disorder.

Objectives of the project include:

1. A mechanism to provide automatic feedback from conversation or the tasks in order to improve the future interaction.
2. Chat Bot within the app.
3. Consult psychiatrist/therapist via video call only when necessary.
4. Implementation of sentimental analysis to understand the mental state of the user.
5. Implementation of Machine Learning Algorithms.
6. Inclusive of some attractive mind games to boost user's brain function.

IV.PROPOSED SYSTEM

In this project, we are going to develop an android app that tracks the mental health of a person. This app will help to the patient to improve their mental condition and encourages them to enjoy life and helps them to stay always positive.

A.   Workflow:

In this app, we will first give the initial instructions on how to use this app after the login page is there. If the user does not have a login credentials, he can register by doing signup. The user will then be asked some questions. According to the user's answer, the current mental state and current mood will be identified, and the result will be displayed to the user. The user can see his mental progress in a graphical visual. Chatbot Assistance will also be provided to the user by which the user can communicate with the bot and following conversation will be recorded and monitored to which Sentimental Analysis will be applied and the current mental state of the user will be determined and observed. According to the report, some activities will be suggested to the user to improve their mental health condition. At the end, the app provides a portal through which the user can consult a psychologist/therapist via video call. If the user needs the help of a psychologist, he can use psychological help. This app is user friendly app. The user interface of this application is user friendly and the features are understandable for the user. This application provides a complete picture of the user's emotional state with the help of some questionnaires asked in the application and the user has to answer it. In this way, we can predict the user's mental health and can assign him a task to improve his mental state.
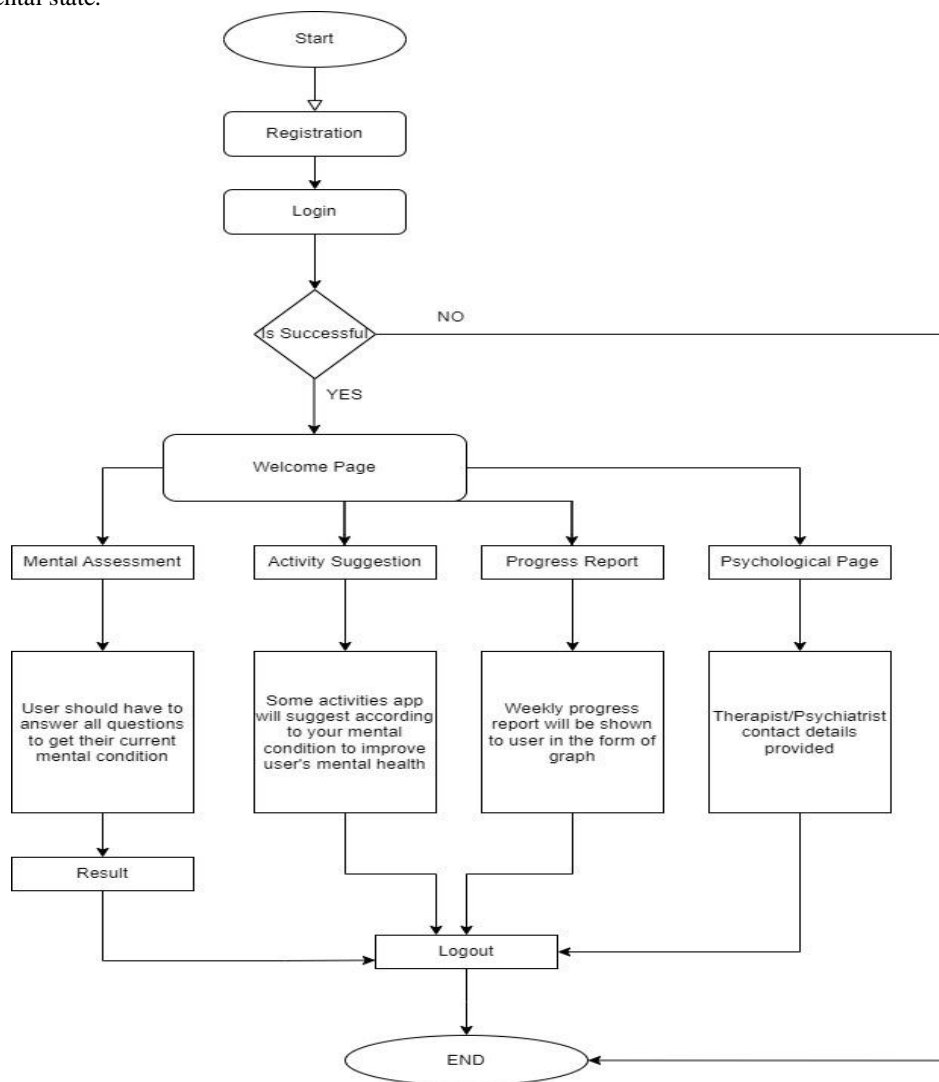

Figure 1: Flowchart of Application

1. Start- here the procedure begins of the application.
2. Registration- the user have to register himself/herself for which basic details will be asked and after filing user will be registered to the application
3. Login - for using the application user have to login by using login credentials which he/she provided during registration process mainly the user id and password.
4. Is successful- this is where the verification happens of the login credentials if he/she entered using correct user id and password if yes then sent to welcome page of the application else end/re-try
5. Welcome page- it is the basically the home page of the application where all the options and features of the application will be displayed and user can access and navigate through the application.
6. Mental assessment- in this module, user will face some questions related to their current mental condition and user have to answer accordingly through which his/her mental condition can be observed.
7. Activity Suggestion- in this module, as per the output of the mental assessment the application will suggest some activities to the user to keep him engaged and improve the ongoing mental conditions and the user have to complete the activities or the task assigned.
8. Weekly Report- An analysis will be done of the user's progress on weekly basis. As per the results of the daily activities/task suggested to him a report will be prepared and displayed to user in form of graphs by which he/she can get to know the progress.
9. Psychological page - it is basically a portal where the user can get contact details of the psychiatrist / therapist by which the user can consult them by personal meetings, phone calls, video calls. It will benefit the user by getting the professional consultation of his/her mental health and issues related to it and get medications.
10. Result- after giving the mental assessment the result will be presented to the user in this module, via this result the user can get to know his/her mental condition status is there's an need of care or everything this fine related to the mental health
11. Logout - after all accessing and navigating through all the modules the user can successfully log out from the application
12. The END of the process.

A. SoftwareRequirement

1) AndroidStudio

Android studio provides a unified environment where you can build apps for android phones, tablets, android TV, etc. In android studio you can design your app front end and as well as their backend functionalities using java language.

2) MySQLdatabase

MySQL database is use for storage purpose. In our case, it stores the user data like user information or his/her predicted mental status.

3) Python

Python is an advanced programming language. Python makes the programming and development of the app easy. In our case, python is use to make API for our app.

4) Postman

Postman is an API (Application Programming Interface) testing tool. It tests, verify and validate the API.

B. Structure of Application

1) Splashscreen

It shows the logo and loading screen of our app.

2) Instructionpages

It shows the instruction and shows what features that the app have.

3) Login and signup page

You can login by providing login credentials. If you are a new user then you can sign up using the signup page.

4) Homepage

Home page contains 4 pages

a) Prediction

Clicking this page, questionnaires page will open which contains different current condition based question. Userneedtoanswerallthequestionstoproceedfurther.Afteransweringallthequestion'sappwillshowthe result according to user'sanswers.

b) Suggestions

This page contains some suggestion activities which will help user to come from depression and feel more motivated.

c) Graphpage

This page shows the weekly report of user in the form of graph

d) Psychologist Consultancy Page

This page shows psychologist details that might be required to a user if he needs to consult the doctor via video call portal.

C. Sentimentanalysis

In this model project, we used a sentiment analysis approach. A sentiment analysis approach helps determine the sentiment behind a user's text. As the name suggests, sentiment analysis helps to analyze user feelings, emotions using some text or review. It mainly focuses on sentiment analysis of textual data.

Sentiment analysis is contextual text content mining that identifies and extracts subjective data in the delivered material and supports business to recognize social sentiment in their brand, services or products while monitoring online conversations. Sentiment analysis is also called subjective analysis, it classifies the text according to the priority and focus of the expressed opinion into positive, neutral and negative.

D. Natural Language Processing

In order for a computer to understand human speech, we need a process called NLP. NLP stands for Natural Language Processing. NLP helps to communicate with people in their own language and is also comprehensible to a computer. In short, it is the center of human-computer communication medium. Sentiment analysis is a subfield of NLP and uses machine learning techniques to identify accurate insights.

E. Random forest Algorithm

In this model we are going to use random forest classifier which a machine learning algorithm used for classifier. Random forest is a supervised machine learning algorithm. Random forest builds multiple decision trees and merge them together to get more accurate result and prediction.

1) RandomForestalgorithmselecttherecordfromthedataset.DependingontheNrecordtreeisconstructed.
2) The decision tree is constructed based on the Nrecords.
3) The number of trees was selected according to the availabledataset.
4) In case of regression problem, each tree in the forest predicts the value of Y for a newrecord.
5) Theaverageofallvalueswerepredicted by allthetreesintheforestinordertocalculatethefinalvalue.
6) In the case of classification problem, every tree inside the forest predicts the category to which the new record belongs.
7) Finally, a new record was assigned to thecategory.

V.RESULTS ANDANALYSIS

A. Installation of mobile application needs to be done by the user andpsychiatrist.

B. During answering the questions, the app will identify a user's mental state and verify whether it has any mental difficulties by gathering data from the user throughcommunication.

C. After that, data obtained by the test and kept in the database will be examined, and if mental trouble is found, the user will receive an alert and some activity and task will be assigned, and a report will begenerated.

D. In general, the app will be available to all users and will include many features in addition to mental health analysis, such as daily blogs, motivational boosts, expert advice, exercises, and so on, all of which will assist the user in resolving mental difficulties while also enjoying fun activities and even talking with expert advice. E. When the alert is delivered to the psychiatrists, they will review the report and contact that specific user to give therapy that theyrequire.
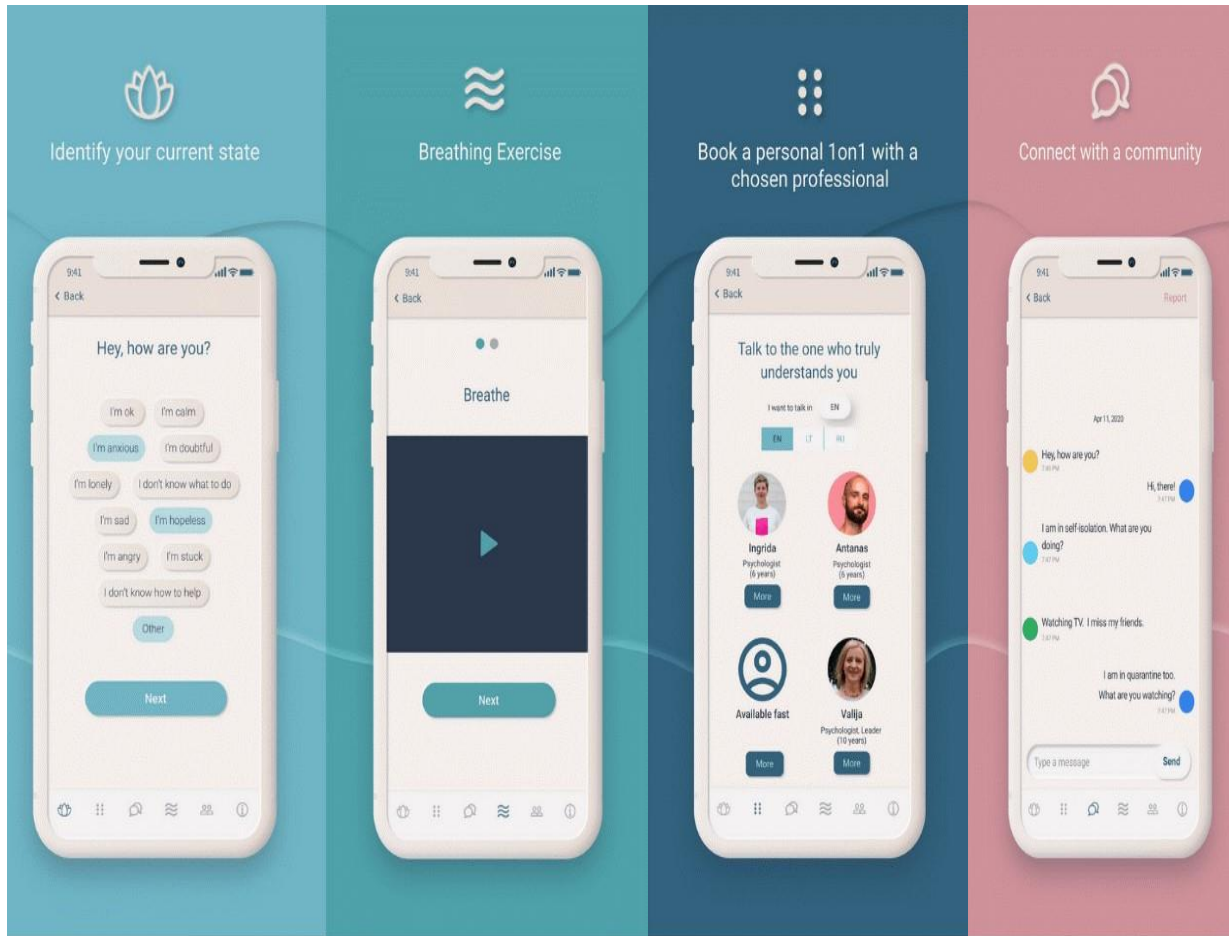
VI.CONCLUSION

Mental health directly affects the way we think, feel and act. It also has a tremendous effect on our physical health. Unfortunately, recognizing mental health concerns is a challenging undertaking, and mistake can lead to significant consequences. More so, many taboos have developed around mental sickness and thus people prefer avoiding the issue rather than consulting professionals. Hence, through this paper, we would like to help our community by developing a user-friendly android application which would allow them to easily diagnose their mental health problems and will also help and support them to improve their mental health, right from the user's home. It will also expand the reach and utilization of e-mental health resources, particularly in rural/remote locations where there is a lack of awareness and availability of experienced specialists. This software will provide evidence-based services to meet current demands while also enhancing client trust in e-mental health care. By utilizing advances in technology, we aim to detect unhealthy digital behaviors by track changes and help users improve their digital lifestyle by providing them smart and personalized health recommendations.

REFERENCES

1. Ariel Teles, Ivan Rodrigues, Davi Viana, Francisco Silva, Luciano Coutinho, Marcus Endler, Ricardo Rabelo."MobileMentalHealth:AReviewofApplicationsforDepressionAssistance," in 2019 IEEE 32nd International Symposium on Computer-Based Medical System (CBMS),2019.
2. Vidhi Mody, Vrushti Mody,"MentalHealthMonitoringSystemUsing ArtificialIntelligence:AReview,"in20195th International Conference for Convergence in Technology (I2CT), Pune,2019.
3. Talayeh Aledavood, John Torous, Ana Maria, Triana Hoyos, John A Naslund, Jukka-Pekka Onnela , Matcheri Keshavan, "smartphone-Based Tracking of Sleep in Depression,AnxietyandPsychoticDisorders,"inSpringer,2019.
4. Anu Priya, Shruti Garga, Neha Prerna Tigga, "Predicting Anxiety, Depression and Stress in Modern Life Using Machine Learning Algorithms," in International Conference on Computational Intelligence and Data Science (ICCIDS 2019), 2019

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