Mental Health Tracker

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Abstract

The project's main objective is to create a mental health tracker. There is a need to evaluate people's mental state in the least intrusive manners possible to determine whether they are in pain, and then provide steps they may take to improve their situation. Users are asked a series of questions, and depending on their responses, tasks are recommended to them to keep track of their mental condition for usage in dashboard displays. All across the world, mental illnesses are very common. However, there is a global shortage of personnel who can provide mental health services. If mental illness is not treated, mortality and suicide attempts may rise. Conversational assistants have gained popularity in recent years as a solution to the problem of scarce resources. In this study, we present a mobile app with an integrated Chatbot that uses techniques from cognitive behavior therapy to help mentally ill people manage their emotions and thoughts. Daily questions from the application ask the user about recent events and their feelings. Using lexicon-based analysis and Natural Language processing, it automatically determines the user's fundamental emotion from the input of natural language.

Keywords : **Android Application, anxiety, authentication, Deep learning, depression, Machine Learning, mental health, prediction, questions, sentiment analysis**

I. INTRODUCTION

Mental health is a necessity in our daily lives. Mental health refers to a state of mind in which a person understands his or her own abilities and limitations. Anxiety disorder, emotional disorder, bipolar affective disorder, depression, eating disorder, and other mental health issues are examples. We had to stay at home during the COVID-19 pandemic due to strict lockdown. We humans are constantly thinking about various things and we become irritated as a result of our overthinking, frustration, and lack of confidence. Isolation, unemployment, financial loss, and many other thoughts rumble around in our heads affecting our mental health. Many people became addicted to drugs and alcohol. People are unable to openly discuss their mental health. They are afraid that others will judge and tease them.

As a result, we incorporated simple activities into our project's model. The self-assessment method is used to determine the user's sentiment. As the name implies, self-assessment uses reviews to assess the user's sentiments and emotions. It primarily analyses sentiment in text data. The following are the application's key points according to "Mental Health Tracker":

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1) Self-Evaluation

2) *Sound activity* (the user must listen to some music that we have included, which will undoubtedly help the user).

We have incorporated these activities into our model. As we already stated, the user's mood stabilization is our only goal. The study also aims to monitor the earliest stages of mental disorders in young people. Additionally, we have provided some of the experts' phone numbers so that they can be contacted regarding their issue.

II. MOTIVATION

Given our current environment, mobile technologies for mental health play an important role. Nowadays, a greater number of people own a mobile phone. Making an application to track users' daily activities is thus becoming easier. Emotional, psychological, and social well-being are all components of mental health. It is extremely difficult to determine one's mental health. Mental health problems are becoming more prevalent. This project is an observational study for patients suffering from mental disorders such as anxiety, depression, and eating disorders. This mental health tracker application was created to monitor and stabilize the user's mood and assist them in getting out of their current situation. The application can assist people in understanding their thoughts, feelings, and so on. Activities such as deep breathing, to-do lists, and self-assessment will assist users in reducing mental problems such as anxiety and depression. The app is essentially a personal health and happiness guide.

A. Terminologies

Some of the key terminologies associated with the use of machine learning in mental health tracking include:

1) *Supervised learning*: This is a type of Machine Learning where the algorithm is trained on labeled data, meaning that the input data is already labeled with the correct output. In the context of mental health tracking, this might involve training a Machine Learning model to recognize patterns in mental health symptoms and predict potential diagnoses based on those patterns.

2) *Unsupervised learning*: This is a type of machine learning where the algorithm is trained on unlabeled data, meaning that the input data is not already labeled with the correct output. In the context of mental health tracking, this might involve using unsupervised learning algorithms to identify patterns or clusters of symptoms that could indicate underlying mental health conditions.

3) *Neural Networks*: This is a type of Machine Learning architecture that is modeled after the structure of the human brain. In the context of mental health tracking, neural networks might be used to process and analyze large amounts of mental health data in order to identify patterns and trends.

4) *Feature Engineering*: This refers to the process of selecting and transforming input data in order to optimize the performance of a Machine Learning model. In the context of mental health tracking, feature engineering might involve selecting specific mental health symptoms or other factors to track and transform those inputs into a format that is optimized for analysis by a Machine Learning model.

5) *Precision and Recall*: These are two key metrics used to evaluate the performance of a Machine Learning model. Precision refers to the percentage of correctly predicted positive cases, while recall refers to the percentage of

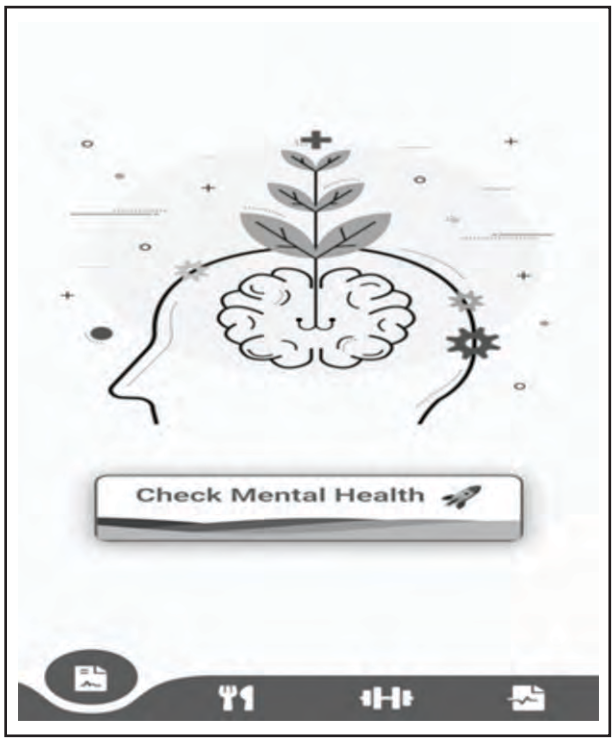

Fig. 1. Home Page

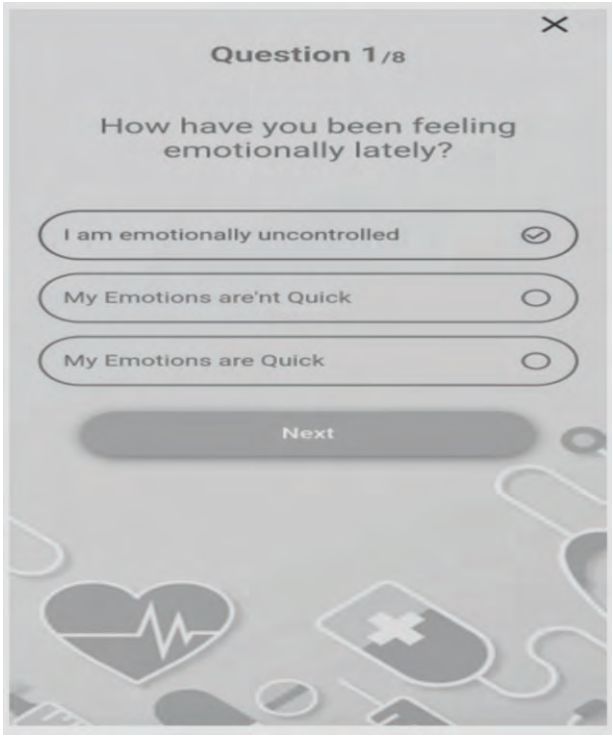

Fig. 2. Mental Health Evaluation

actual positive cases that are correctly identified by the model.

6) *Training Data*: This refers to the data used to train a Machine Learning model. In the context of mental health tracking, this might involve using historical mental health data to train a model to recognize patterns and predict potential diagnoses.

7) *Testing Data*: This refers to the data used to evaluate the performance of a Machine Learning model. In the context of mental health tracking, this might involve using a set of new or previously unseen mental health data to evaluate the accuracy of a model's predictions [1].

8) *Home Page*: Home page is shown in Fig. 1.

B. Preprocessing Method

Preprocessing in a mental health tracker refers to the steps taken to clean and transform the raw data collected from users before analysis. The goal of preprocessing is to ensure that the data should be accurate and consistent.

Here are some common preprocessing steps for mental health trackers:

1) *Data Cleaning*: This involves removing any irrelevant, incomplete, or inaccurate data points that could skew the analysis.

2) *Data Transformation*: This involves converting the raw data into a format that is suitable for analysis. For example, converting text responses into numerical values or categorical variables.

3) *Normalization*: This involves scaling the data to ensure that it falls within a specific range. This can help to reduce the impact of outliers and make the data more comparable across different users.

4) *Feature Selection*: This involves selecting the most relevant features from the dataset that are likely to be associated with mental health outcomes. This can help to reduce the dimensionality of the dataset and improve the accuracy of the analysis [3].

5) *Handling Missing Data*: This involves dealing with any missing values in the dataset. Depending on the amount of missing data, this may involve imputing missing values, removing missing values, or using statistical methods to estimate missing values.

III. PROCESS

The process of a mental health tracker involves several steps, from data collection to analysis and interpretation. Here are the general steps involved in a mental health tracking process:

1) *Data Collection*: The first step in a mental health tracking process is to collect data from users. This may involve asking users to complete surveys, questionnaires, or other types of assessments. The data collected may include demographic information, symptoms, behavior, and other relevant factors.

2) *Data Storage*: Once the data has been collected, it needs to be stored securely in a database or other type of data repository. It is important to ensure that the data is stored in a way that protects the privacy and confidentiality of the users.

3) *Data Preprocessing*: As discussed earlier, data preprocessing involves cleaning, transforming, normalizing, and selecting relevant features from the data.

4) *Analysis*: Once the data has been preprocessed, it can

be analyzed using various statistical and Machine Learning techniques. The goal of analysis is to identify patterns, trends, and relationships in the data that may be associated with mental health outcomes.

5) *Visualization*: Data visualization is an important step in mental health tracking as it can help to communicate the findings of the analysis in a clear and understandable way. Visualization can include charts, graphs, and other types of visual representations of the data.

6) *Interpretation*: The final step in the mental health tracking process is to interpret the findings of the analysis. This may involve drawing conclusions about the factors that are associated with mental health outcomes and developing recommendations for interventions or treatments that may be helpful for users.

Overall, the process of mental health tracking involves collecting and analyzing data in a way that is both ethical and scientifically rigorous. By doing so, mental health trackers can help to identify risk factors, monitor progress, and provide personalized interventions for users.

The steps for sentiment analysis are as follows:

1) *Sentiment Analysis:* Sentiment analysis can be used in mental health tracking to analyze and understand the emotional state of users. By analyzing the sentiment expressed in user-generated text data, mental health trackers can gain insights into the user's mental health status including their mood, emotions, and overall well-being [2]. Here are some ways that sentiment analysis can be used in a mental health tracker:

2) *Identifying Negative Sentiment*: Sentiment analysis can be used to identify negative emotions and sentiments expressed by users, such as sadness, anxiety, or anger. This can help mental health trackers to identify users who may be struggling with mental health issues and provide them with appropriate support. Sentiment analysis can be done using Machine Learning approach, lexicon based approach, and hybrid approach [4, 5].

3) *Measuring Mood Changes*: By analyzing changes in sentiment over time, mental health trackers can measure the mood changes of users and identify patterns or triggers that may be contributing to their mental health status. This can help to monitor the effectiveness of interventions and treatments over time.

4) *Personalizing Interventions*: Sentiment analysis can be used to personalize interventions and treatments for users based on their emotional state. For example, if a user is expressing negative sentiment, the tracker may recommend relaxation techniques or other coping strategies to help them manage their emotions.

5) *Monitoring Social Media*: Sentiment analysis can be used to monitor social media platforms for signs of negative sentiment related to mental health issues. This can help mental health trackers to identify trends or patterns in social media activity related to mental health and respond appropriately.

Overall, sentiment analysis can provide valuable insights into the emotional state of users in a mental health tracker. By analyzing sentiment data, mental health trackers can identify users who may need additional support, personalize interventions and treatments, and monitor the effectiveness of their services over time [6].

A. Nutrition

Nutrition plays an important role in mental health, and tracking nutrition can be an important aspect of a mental health tracker. Here are some ways that nutrition can be incorporated into a mental health tracker:

1) *Tracking Dietary Intake*: A mental health tracker can include a feature for users to log their daily food intake. This information can be used to monitor the user's nutrient intake and identify potential deficiencies or imbalances in their diet that may be affecting their mental health.

2) *Nutrient Analysis*: A mental health tracker can use nutrient analysis to calculate the user's intake of specific nutrients, such as Omega-3 fatty acids, B vitamins, and magnesium, which are known to be important for mental health.

3) *Personalized Nutrition Recommendations*: Based on the user's dietary intake and nutrient analysis, a mental health tracker can provide personalized nutrition recommendations to improve the user's mental health. For example, if the user is deficient in Omega-3 fatty acids, the tracker may recommend increasing their intake of fatty fish or taking a supplement.

4) *Mood and Food Diary*: A mental health tracker can include a feature for users to log their mood and the foods

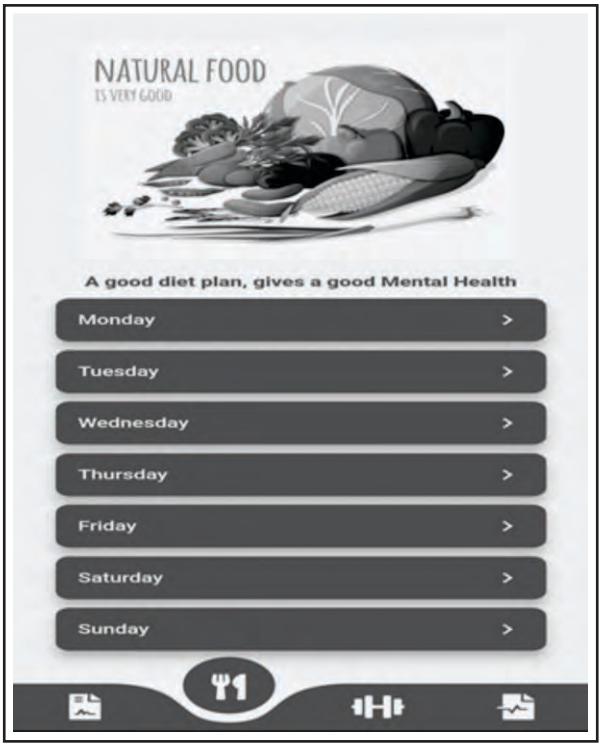

Fig. 3. Diet Plan

they eat, allowing them to identify patterns between their diet and their emotional state. This can help users to make connections between their dietary habits and their mental health.

5) *Nutrition education*: A mental health tracker can provide users with nutrition education, including information on the links between nutrition and mental health, healthy eating habits, and tips for maintaining a balanced diet.

Overall, incorporating nutrition tracking into a mental health tracker can help users to improve their mental health by providing personalized nutrition recommendations, monitoring nutrient intake, and promoting healthy eating habits.

B. Physical Exercise

Physical exercise has been shown to have a positive impact on mental health and can be an important component of a mental health tracker. Here are some ways that physical exercise can be incorporated into a mental health tracker:

1) *Activity tracking*: A mental health tracker can include a feature for users to track their physical activity such as steps taken, distance walked, or calories burned. This information can be used to monitor the user's level of physical activity and identify potential patterns or trends that may be affecting their mental health.

2) *Personalized exercise recommendations*: Based on the user's physical activity level, a mental health tracker can provide personalized exercise recommendations to improve their mental health. For example, if the user is not meeting recommended levels of physical activity, the tracker may recommend a specific type of exercise or a certain amount of exercise per week.

3) *Mood and Activity Diary*: A mental health tracker can include a feature for users to log their mood and physical activity, allowing them to identify patterns between their exercise habits and their emotional state. This can help users make connections between their physical activity and their mental health.

4) *Exercise Challenges and Rewards*: A mental health tracker can include challenges or rewards for achieving certain physical activity goals, such as walking a certain number of steps per day or completing a certain number of workouts per week. This can help motivate users to engage in regular physical activity.

5) *Exercise Education*: A mental health tracker can provide users with education about the benefits of exercise for mental health, tips for getting started with a new exercise routine, and information about different types of exercise that may be beneficial for mental health.

Overall, incorporating physical exercise tracking into a mental health tracker can help users improve their mental health by providing personalized exercise recommendations, monitoring physical activity levels, and promoting healthy exercise habits.

C. Music Therapy

Music therapy is a type of therapy that uses music to address physical, emotional, cognitive, and social needs of individuals with mental health issues. Incorporating music therapy into a mental health tracker can provide users with a valuable tool for managing their mental health. Here are some ways that music therapy can be incorporated into a mental health tracker:

1) *Music Selection*: A mental health tracker can provide

users with a curated selection of music that is known to have a positive impact on mental health, such as calming music or uplifting music. Users can listen to this music during periods of stress or anxiety to help manage their emotions.

2) *Mood-based Playlists*: A mental health tracker can offer users mood-based playlists that are designed to help manage specific emotions or mental health issues, such as anxiety or depression. Users can select a playlist that matches their mood or emotional state to help improve their mental health.

3) *Guided Music Therapy Exercises*: A mental health tracker can provide guided music therapy exercises such as breathing exercises or visualization exercises that use music to help users manage their mental health. These exercises can be personalized to the user's specific mental health needs.

4) *Integration with wearable technology*: A mental health tracker can integrate with wearable technology, such as headphones or earbuds to provide users with a seamless music therapy experience. Users can listen to music therapy exercises on their wearable device while on the go providing them with a convenient way to manage their mental health.

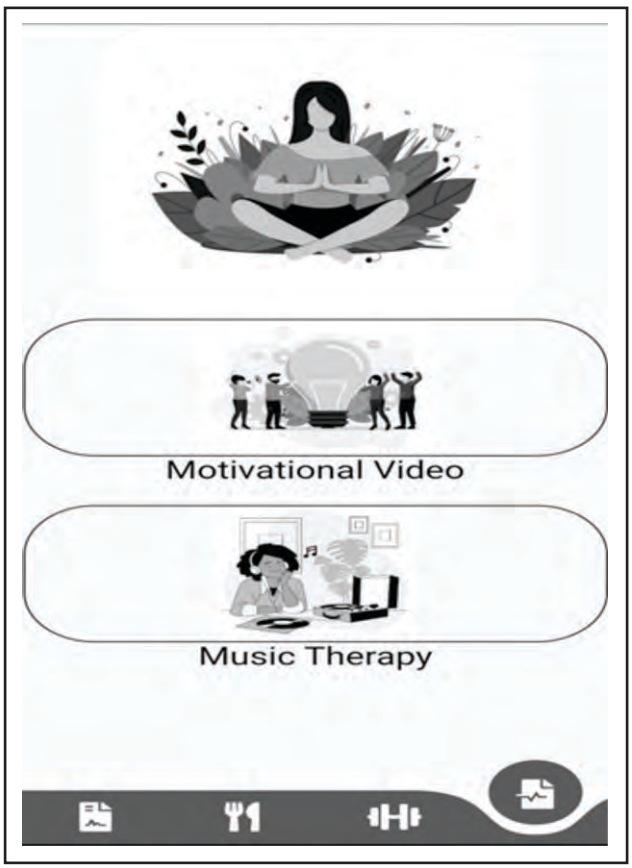

Fig. 4. Mental Therapy

5) *Music Therapy Education*: A mental health tracker can provide users with education about the benefits of music therapy for mental health, tips for incorporating music therapy into their daily routine, and information about how music can be used to manage specific mental health issues.

Overall, incorporating music therapy into a mental health tracker can provide users with a valuable tool for managing their mental health. By providing personalized music therapy exercises, mood-based playlists, and education about the benefits of music therapy, mental health trackers can help users to improve their mental health and well-being.

IV. MOBILE APP

These are the necessary software configurations:
Operating Systems: Mac OS, Linux, Windows 10/8/7 (including 64-bit),
Language: Python 3
IDE: Spyder 3 with Jupyter Notebook Structure: Tkinter

These are the necessary minimal hardware setups:
Processor: Intel core 2 duo or newer processor required.
Memory: 1 GB or more
HDD: Atleast 256 GB
Monitor: Minimum 1024 × 768 resolution

V. RESULTS AND DISCUSSION

A mental health tracker is certainly a tool that can help individuals monitor and manage their mental health. It typically involves recording and tracking various factors that can impact mental health, such as mood, sleep, exercise, medication, and therapy sessions.

One benefit of using a mental health tracker is that it can help individuals identify patterns and triggers that affect their mental health. For example, someone might notice that their mood is consistently lower on days when they don't exercise, or that their anxiety increases after drinking caffeine. By identifying these patterns, individuals can make adjustments to their routine or seek professional help to address the underlying issues.

However, it is important to note that a mental health tracker should not be a substitute for professional mental health treatment. While tracking your mental health can be a useful tool for self-care, it is not a replacement for therapy or medication prescribed by a mental health professional.

Additionally, some people may find that tracking their mental health can be triggering or overwhelming, particularly if they struggle with obsessive or perfectionistic tendencies. In these cases, it is important to approach mental health tracking with mindfulness and self-compassion, and to seek support if needed.

Overall, a mental health tracker can be a helpful tool for individuals who want to take an active role in managing their mental health. However, it is important to approach mental health tracking with caution, and to seek professional help if needed.

VI. CONCLUSION AND FUTURE WORK

To conclude, a mental health tracker can be a useful tool for individuals to monitor their mental health and identify patterns or trends that may be impacting their well-being. By tracking various factors such as mood, sleep, exercise, symptoms, and triggers, individuals can gain a better understanding of their mental health and make informed decisions about their treatment and self-care.

Machine Learning algorithms can also be incorporated into mental health trackers to help analyze large amounts of data and identify patterns that may not be immediately apparent to the user. However, it is important to note that while mental health trackers can be helpful, they should not replace professional medical advice or treatment. It is important for individuals to seek the guidance of a healthcare professional for diagnosis and treatment of mental health conditions.

Overall, mental health trackers can be a valuable tool for individuals to proactively manage their mental health, monitor their progress over time, and make informed decisions about their treatment and self-care.

AUTHORS' CONTRIBUTION

Hardik Dangiya specializes in Python and Android programming and has contributed to the front end development of the project. He has also worked on framework and Machine Learning in application. Mahati Gholap has managed all the draft transcripts, the literature review, and helped both authors come to a consensus on the article's final form. She also made sure that all the project's technological concerns were resolved. Vaishnavi Rashivadekar has experience with the backend and database sections; her areas of expertise include Firebase and MySQL database management.

CONFLICT OF INTEREST

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in the manuscript.

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About the Authors

Mahati Gholap is an Engineering student (Information Technology). She has a passion for Android design and development. She has worked on a variety of projects featuring ingenious thinking and an overview of an application, which include Sentiment Analysis, weather forecasting, and the acquisition of train tickets, all of which can increase quality and efficiency in a wide range of applications. She continually looks for new methods to incorporate design into software development and is remarkably innovative.

Hardik Dangiya is an Engineering student with the department of Information Technology with a passion for Artificial Intelligence and Machine Learning. He has worked on several projects related to developing intelligent algorithms such as Sentimental Analysis and car parking system that can improve efficiency and accuracy in various applications. He is highly innovative and is constantly exploring new ways to integrate AI and ML into software development.

Vaishnavi Rashivadekar is a data analysis and backend development Engineering student in the department of Information Technology. She has worked on several projects including the creation of concepts and an overview of programming like the Pantry System and the Car Parking System that can increase productivity and accuracy in a variety of projects.