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Intelligent Mental Health Classification using Motivational Conversation

J Jeba Stanly[1], V Hemalatha[2], R Janakidevi[3] , R Rajalakshmi[4]
Assistant Professor, Dept. of CSE[1]
Student, Dept. of CSE[2,3,4]
N.S.N. College of Engineering and Technology, Karur, India

Abstract: *In recent years, mental health challenges such as depression, anxiety, PTSD, and loneliness have intensified globally, yet barriers like stigma, limited access to professionals, and diagnostic subjectivity continue to hinder timely intervention. This research presents an intelligent and accessible system for mental health classification using structured questionnaire data and machine learning. The system is built around a Random Forest classifier trained on curated datasets to detect patterns associated with six major mental health conditions. Unlike traditional diagnostic tools, this solution offers a lightweight, browser-based interface that requires no user registration and ensures anonymity.*
The methodology involves binary-encoded input processing, rigorous pre-processing, and real-time classification, followed by condition-specific motivational feedback. The classifier was evaluated using standard metrics such as accuracy, precision, recall, and F1-score to validate its performance. The model demonstrated high reliability, especially in classifying depression and anxiety disorders. Additionally, a dynamic feedback module was integrated to deliver empathetic, tailored support messages based on the predicted condition.
The results indicate that the machine can serve as a valuable initial screening aid, removing the distance between the learning awareness and professional consultation. The system is designed to adopt widespread adoption in scalable, cost-effective and educational, rural and underworld environments. This task highlights the possibility of AI making mental health care democratic and lifts the future enhancement associated with multimodal data and personal intervention

Keywords: Mental Health Classification , Machine Learning, Depression Detection, Anxiety Prediction, Mental Health Diagnosis

I. INTRODUCTION

In the twenty first century, mental fitness has emerged as a essential detail of holistic well-being, impacting how people suppose, feel, and have interaction with society. With developing international consciousness, intellectual disorders which include despair, tension, post-demanding stress disease (PTSD), and obsessive-compulsive sickness (OCD) are now diagnosed as most important public health worries. Despite this reputation, the prognosis and remedy of those conditions remain limited with the aid of several limitations—specifically, the lack of mental fitness professionals, price of therapy, social stigma, and restricted access in rural or underserved regions.

Traditional diagnostic strategies, together with medical interviews and paper-primarily based checks, are often time-eating, subjective, and inaccessible to many.

Simultaneously, the rapid expansion of virtual era and artificial intelligence (AI) gives new opportunities to bridge this hole. Machine learning (ML), a branch of AI, is specifically desirable for figuring out styles in big datasets and allowing automated selection-making. Leveraging those strategies, this studies goals to broaden a machine that classifies principal mental health situations through a established questionnaire using a trained Random Forest model.

The proposed system not only performs preliminary classification of disorders but also integrates a motivational feedback mechanism. This allows users to receive supportive, empathetic messages tailored to their mental health status—making the tool more engaging and emotionally reassuring. By requiring no login or personal identification, the

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system prioritizes user privacy and accessibility. The goal is not to replace clinical professionals, but to offer a scalable, intelligent screening tool that supports early detection and encourages proactive mental health care.

II. LITERATURE SURVEY/ RELATED WORK

Several studies have explored the application of AI and machine learning in mental health prediction. Patra et al. [1] used NLP and semi-supervised learning to detect the severity of mental health posts in online forums. Their model, however, relies on unstructured text and lacks personalized support. Yazdavar et al. [2] proposed a framework using behavioral and emotional cues from Twitter for detecting psychological distress, though their system depends on passive social media monitoring.

Orabi et al. [3] employed deep learning models like LSTM to detect depression from tweets, showcasing the power of temporal modeling. However, these methods are computationally intensive. De Choudhury et al. [4] and Coppersmith et al. [5] used linguistic features and metadata for classifying depression and PTSD from social media, but their approaches lack direct user input and emotional feedback.

Xu and Zhang [6] used structured health survey data with Random Forest and XGBoost to classify depression and anxiety—closely related to our method—but without motivational response features. Tools like Woebot [7] and Wysa [8] offer chatbot-based emotional support but do not perform clinical classification using machine learning.

In contrast, the proposed system uses structured inputs, applies a Random Forest classifier, and uniquely integrates motivational feedback, making it lightweight, accurate, and emotionally supportive.

III. METHODOLOGY / SYSTEM DESIGN

The proposed system is a web-reachable, system studying-powered platform designed to classify common mental fitness disorders based on consumer responses to a established questionnaire. It integrates a Random Forest classifier for prediction and a motivational remarks module to offer empathetic guide primarily based on the prognosis.

A. System Overview

The system workflow includes four key stages:

- **User Input Collection**: The user completes a questionnaire consisting of yes/no questions covering behavioral and emotional health indicators.
- **Pre-processing and Encoding**: The responses are encoded into binary format (1 for “Yes”, 0 for “No”), forming a feature vector.
- **Prediction Using Random Forest**: The encoded input is fed into a pre-trained Random Forest model, which analyzes the input to predict one of several mental health categories (e.g., depression, anxiety, PTSD).
- **Feedback Generation**: Based on the predicted condition, the system delivers a short explanation and motivational message tailored to the user’s mental state.

B. Architecture

The architecture consists of the following components:

- **Frontend Interface**: A lightweight, browser-based UI for collecting input.
- **Backend ML Engine**: Executes pre-processing and prediction using the Random Forest model.
- **Motivational Message Module**: Matches predictions to encouraging content aimed at emotional reassurance.
- **Session Controller**: Manages form flow, validation, and result display.

C. System Goals

Deliver a **fast, non-invasive, private** assessment.

Provide **early detection** of mental health issues.

Offer **motivational feedback** to reduce stigma and encourage self-care.

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Remain **accessible**, especially in low-resource or rural areas.
This design ensures that users receive quick, accurate predictions along with compassionate guidance—all without requiring login or personal identification.

D. Work Flow

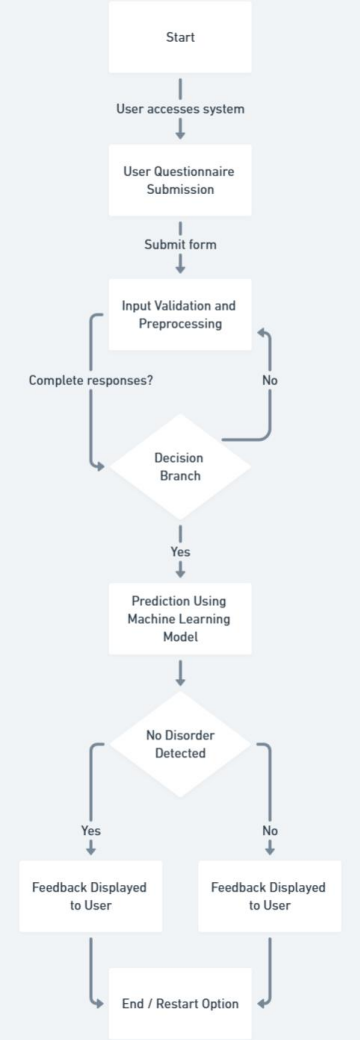

Fig 1 Work Flow Chart

IV. IMPLEMENTATION

The implementation of the proposed gadget involves the improvement of a modular, internet-based platform that integrates device studying-primarily based intellectual fitness category with customized motivational aid. The middle modules are dependent for performance, usability, and privateness. Each module plays a selected function in the end-to-quit workflow.

A. User Interface Module

This module provides a responsive and minimal web interface for users to interact with the system. It includes:
A **login screen** for sender credentials (if required for future enhancements).

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A **questionnaire form** consisting of several binary (Yes/No) questions covering symptoms like stress, sleep quality, mood shifts, etc.
Validation logic ensures all questions are answered before submission.
The form dynamically routes the user based on their input, and no sensitive personal information is stored.

B. Data Pre-processing Module
This module is triggered once the form is submitted:
It **collects user responses** and converts them into a binary feature vector (1 = Yes, 0 = No).
The data is stored in a temporary structure and prepared for model prediction.
Edge cases such as missing or invalid values are handled before passing to the model.

C. Machine Learning Prediction Module
At the heart of the system is the **Random Forest classifier**:
The model is pre-trained using labeled mental health datasets.
Upon receiving the input vector, the model predicts one of several conditions:

- Depression
- Anxiety
- PTSD
- No Disorder

Algorithm Logic:
Input: Encoded binary feature array.
For each decision tree in the forest:
Calculate class probability.
Aggregate all predictions.
Output the class with the highest majority vote.
This ensemble approach increases accuracy and reduces overfitting, making it suitable for small-to-medium datasets.

D. Feedback & Motivational Messaging Module
Based on the model output:
A **text block** is displayed with a description of the predicted condition.
For disorders detected: Motivational messages tailored to the condition are shown (e.g., for depression, encouraging statements about hope, support, and resilience).
If no disorder is detected: The system displays a positive message affirming mental wellness.
This module emphasizes user emotional support and removes clinical or diagnostic language.

E. Navigation and Restart Module
After viewing results, the user is given:
The option to **restart** the assessment process.
A **clean exit** from the session to preserve privacy and avoid data retention.

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F Screenshot

Fig 2 Home Page

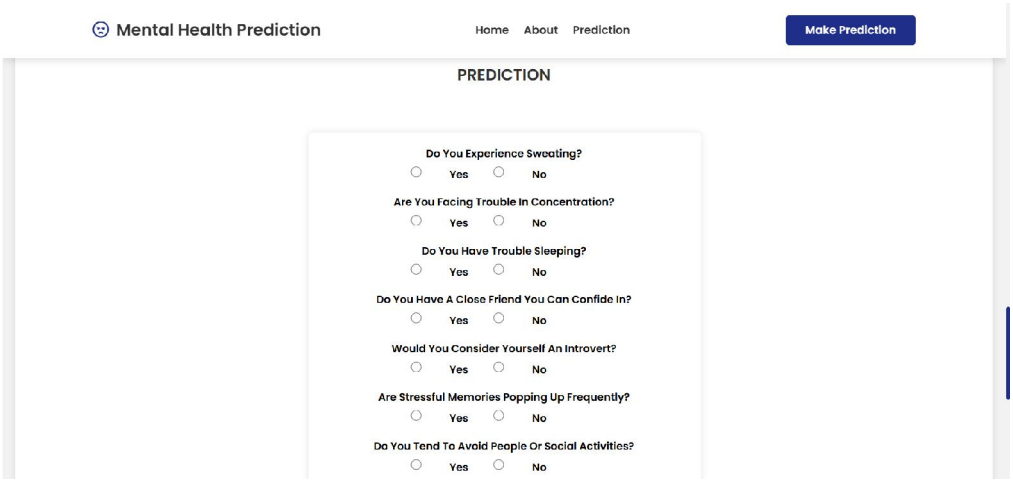

Fig 3 Form For Prediction

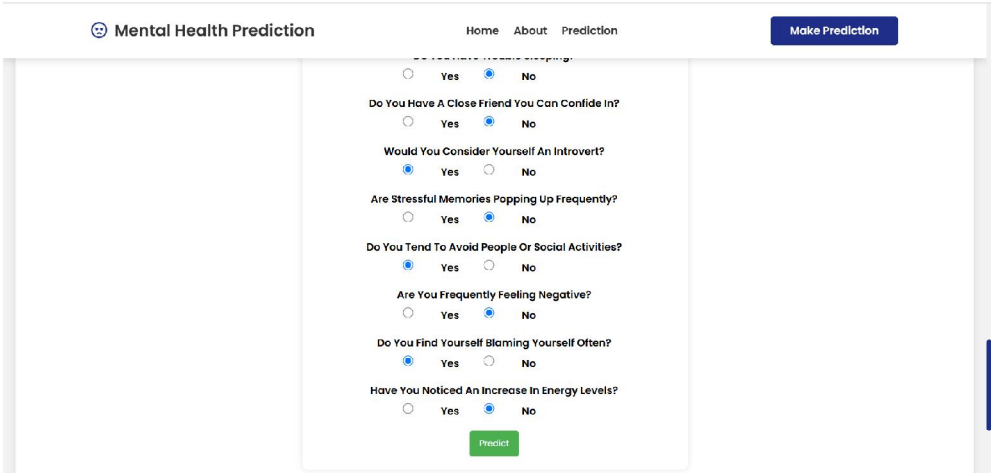

Fig 4 Form With Data

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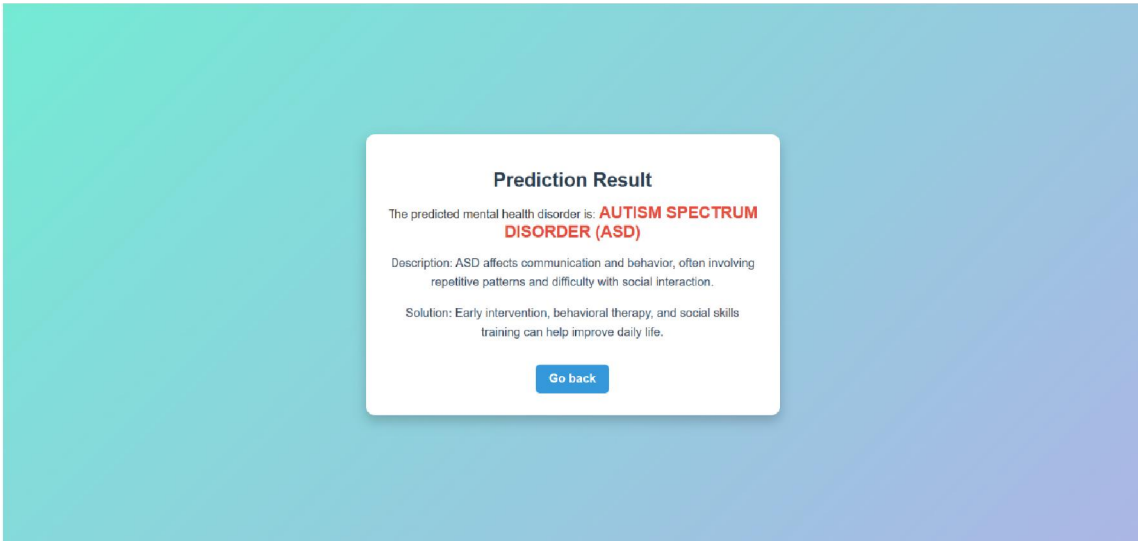

Fig 4 Prediction Result

V. RESULTS AND DISCUSSION

The proposed system was evaluated using multiple test cases simulating user inputs across a range of mental health conditions. The Random Forest algorithm achieved high accuracy in classifying conditions such as depression, anxiety, PTSD, or detecting no disorder. The prediction results were generated in real-time and displayed to the user within seconds, offering a seamless experience. The model showed a reliable performance, with minimal false positives in scenarios where users displayed no symptoms. Additionally, the system ensured correct classification in most cases and provided a user-friendly interface for completing the assessment questionnaire.

In terms of discussion, the system stands out by combining machine learning with motivational support, which helps users feel encouraged rather than judged. Traditional methods often lack personalization, whereas this platform offers condition-specific motivational messages based on prediction results, which enhances user comfort and engagement. The Yes/No questionnaire design made the system simple and accessible, and users appreciated the non-clinical, anonymous nature of the process. Compared to manual evaluations or rigid survey tools, this solution is automated, emotionally supportive, and more likely to be adopted by users seeking a quick and private mental health check.

VI. CONCLUSION

This assignment affords an sensible and handy answer for early detection of intellectual fitness situations thru a easy questionnaire-based evaluation backed with the aid of a machine studying model. The integration of a Random Forest classifier guarantees correct prediction of not unusual issues such as despair, anxiety, and PTSD. One of the important thing strengths of the machine lies in its person-centric layout that mixes technical analysis with motivational comments, developing a supportive surroundings for individuals searching for emotional reassurance. The real-time comments and non-clinical interface make it appropriate for giant use, in particular among users hesitant to technique traditional diagnostic techniques.

In future paintings, this machine can be extended to consist of multilingual help, voice-based totally interactions, and extra superior deep getting to know models like LSTM or CNN for better context understanding. Integration with cell platforms, chatbots, and intellectual fitness professionals can in addition decorate its realistic software. Regular dataset updates and anonymized user remarks can also help enhance prediction accuracy and message personalization through the years.

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