

# An Intelligent Web-Based Mental Health Assessment System Using Machine Learning

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## ABSTRACT

Mental health disorders such as stress, anxiety, and depression have become increasingly prevalent due to modern lifestyle pressures, academic stress, and social isolation. Early identification of mental health risks is critical to prevent long-term psychological complications and improve overall well-being. This project presents an intelligent web-based Mental Health Detection System that leverages machine learning techniques to analyse user lifestyle, behavioural, and emotional parameters. The system collects structured inputs including sleep patterns, work stress, social support, anxiety levels, depressive episodes, and substance use. A trained Random Forest classifier processes these inputs to classify users into three categories: Healthy, Intermediate (needs emotional and social support), and Likely Mental Health Issue. The application also provides confidence scores, personalized wellness suggestions, reflection questions, and a 7-day improvement plan. Developed using Python, Flask, and Scikit-learn, the proposed system demonstrates how data-driven approaches can support early mental health assessment, promote self-awareness, and encourage timely intervention while maintaining user privacy and accessibility.

## KEYWORDS

Mental Health Detection, Machine Learning, Random Forest, Mental Wellness, Flask Web Application, Predictive Analytics

## INTRODUCTION

Mental health plays a vital role in determining an individual's emotional stability, cognitive functioning, and overall quality of life [11]. In recent years, mental health challenges have escalated significantly due to rapid technological changes, increased academic and professional pressure, reduced physical activity, and limited social interaction [20]. Despite the growing prevalence of mental health issues, many individuals remain unaware of their condition or hesitate to seek professional help due to stigma, cost, or lack of accessibility [12]. Traditional mental health assessment methods primarily depend on clinical interviews and psychological questionnaires, which are time-consuming and require trained professionals [14].

Advancements in machine learning and data analytics have opened new possibilities for automated and early mental health assessment [1]. By analysing behavioural and lifestyle patterns, intelligent systems can detect early warning signs and provide preliminary guidance [15]. This project introduces a web-based Mental Health Detection System that

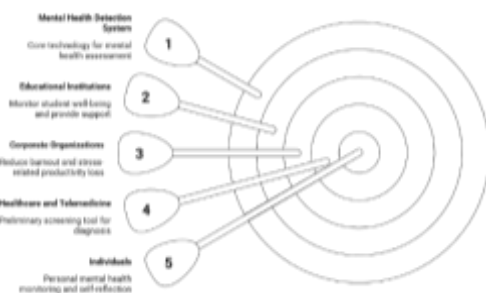
applies machine learning techniques to predict mental health risk levels using user-provided data [9]. The system aims to bridge the gap between mental health awareness and professional intervention by offering an accessible, confidential, and user-friendly screening platform [7].

## MAIN OBJECTIVES

The primary objective of this project is to develop an intelligent and automated system capable of predicting mental health conditions using machine learning techniques [2]. The system aims to analyse user-provided lifestyle and psychological parameters and classify mental health status accurately [9]. Another key objective is to provide early detection and preventive guidance through personalized wellness suggestions and structured improvement plans [15]. The project also focuses on building a secure, user-friendly web application that enables self-assessment without social stigma [7]. Additionally, the system aims to support administrators by offering analytical insights through dashboards and downloadable reports for monitoring trends and improving decision-making [10].

## APPLICATIONS

The Mental Health Detection System can be applied in multiple real-world scenarios to support early mental health assessment and awareness [11]. Educational institutions can use the system to monitor student well-being and identify individuals who may need counseling support [12]. Corporate organizations can adopt the system as part of employee wellness programs to reduce burnout and stress-related productivity loss [20]. Healthcare and telemedicine platforms can integrate the system as a preliminary screening tool before professional diagnosis [14]. Individuals can use the application for personal mental health monitoring and self-reflection [15]. The system is also suitable for research and academic environments where behavioural data analysis and predictive modeling are required [8].



## ALGORITHMS

The system uses the Random Forest classification algorithm as the core machine learning model for mental health prediction [9]. Random Forest is an ensemble learning technique that constructs multiple decision trees and combines their outputs to improve prediction accuracy and reduce overfitting [9]. The algorithm efficiently handles multiple input features such as stress level, sleep duration, anxiety, and social support, making it suitable for complex and uncertain behavioural data [5]. During preprocessing, user inputs are cleaned, validated, and scaled before being passed to the trained model [6]. The algorithm outputs both a predicted mental health class and a confidence score, enabling reliable and interpretable assessment results [10].

## SCOPE

The scope of this project includes the design and development of a web-based mental health assessment platform using machine learning techniques [2]. The system focuses on early detection rather than clinical diagnosis and is intended to complement professional mental health services [11]. It supports user registration, secure login, structured data collection, automated prediction, personalized recommendations, and administrative monitoring [7]. The system allows users to reassess their mental health periodically, enabling continuous self-monitoring [12]. The modular architecture ensures scalability, maintainability, and adaptability for future enhancements such as advanced models, mobile applications, and real-time data integration [8].



## EFFECTS

The implementation of the Mental Health Detection System has significant positive effects on mental health awareness and early intervention [11]. The system encourages individuals to reflect on their emotional and behavioural patterns, promoting self-awareness and proactive care [13]. By reducing dependence on manual assessments, the system enables faster and more consistent screening [14]. It also helps reduce social stigma by allowing users to assess their

mental health privately [12]. On an institutional level, the system supports data-driven insights that can guide wellness initiatives and policy decisions [8]. Overall, the system contributes to improved mental health literacy and preventive healthcare practices [15].

## BENEFITS

The proposed system offers several benefits, including accessibility, affordability, and ease of use [14]. Users can perform mental health assessments anytime without requiring appointments or professional assistance [11]. The use of machine learning ensures objective and consistent predictions based on data patterns [2]. Personalized wellness plans and reflection questions enhance user engagement and motivation for improvement [15]. The system's lightweight architecture and CSV-based data storage reduce deployment and maintenance costs [6]. For administrators, the system provides structured data analysis and reporting capabilities, enabling efficient monitoring and evaluation [10].



## DIFFICULTIES AND CHALLENGES FACED

Despite its advantages, the project faces certain challenges [15]. Mental health data is inherently subjective and varies significantly across individuals, making accurate feature representation difficult [5]. Converting emotional and behavioural responses into numerical values may introduce bias or ambiguity [13]. The system relies on user honesty, which can affect prediction accuracy [12]. Limited dataset diversity can impact model generalization [9]. Ensuring data privacy and ethical handling of sensitive information is also a critical challenge [14]. Additionally, the system does not replace professional diagnosis and must clearly communicate its limitations to users [11].

## CONCLUSION

The Mental Health Detection Using Machine Learning project successfully demonstrates the potential of intelligent systems in supporting early mental health assessment [15]. By analysing lifestyle and behavioural inputs through a Random Forest classifier, the system accurately classifies mental health conditions and provides meaningful feedback [9]. The web-based implementation ensures accessibility, usability, and privacy while offering personalized wellness guidance

[7]. The system effectively bridges the gap between mental health awareness and professional intervention, highlighting the role of machine learning in preventive healthcare [11]. The project validates that data-driven approaches can significantly enhance mental health monitoring and self-care initiatives [1].

## FUTURE ENHANCEMENTS

Future enhancements of the system may include the integration of deep learning models for improved prediction accuracy and personalization [3]. Real-time data collection from wearable devices such as fitness trackers and smartwatches can enhance assessment reliability [11]. The system can be extended with multilingual support and a mobile application for wider accessibility [14]. Chatbot-based emotional support, professional appointment scheduling, and automated follow-up reminders can further improve user engagement [15]. Cloud deployment and secure database integration can enhance scalability and performance, transforming the system into a comprehensive digital mental health assistance platform [19].

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