MENTAL HEALTH ASSESSMENT USING AI

A report submitted to

Techno India University, West Bengal

for the partial fulfillment of

Bachelor of Technology (B. Tech.)

degree in

Computer Science & Engineering

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CERTIFICATE

This is to certify that the Dissertation Report entitled , **"MENTAL HEALTH ASSESSMENT USING AI "** submitted by **" HITESH MAHTO , ANIKET MITRA , BISHAL RAJAK , SOUMYAJIT BISWAS and MAZAR IMAM KHAN "** to **Techno india university, Kolkata , India ,** is a record of bonafide Project work carried out by them under my supervision and guidance and is worthy of consideration for the award of the degree of **Bachelor of Technology (B.Tech) in Computer Science & Engineering**

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CONTENTS

Abstract

1 . INTRODUCTION **2**

1.1 Objectives …… 2

1.2 Problem Specification …….. 3

1.3 Methodologies …….. 3

1.4 Relevance and Importance ……. 5

2. LITERATURE SURVEY **6**

3 . PROJECT METHODOLOGY **7**

3.1 Data ……. 7

3.2 Model Training …… 7

3.3 Web Application Development …….. 7

3.4 Risk Level Classification …… 7

3.5 Testing and Evaluation …… 8

4. System Architecture **9**

4. Results & Discussion **10**

5 . Conclusion **12**

6. References **13**

ABSTRACT

Mental health has become a significant concern in today's fast-paced and stressful environment, particularly among students and young adults. This project presents a lightweight, AI-based mental health assessment tool designed to provide an initial self-evaluation based on user responses to a short questionnaire. The system consists of a Flask-based web application integrated with a machine learning model trained using a linear regression algorithm.

The model takes as input the user's responses to 10 standardized questions related to emotional well-being, anxiety, sleep patterns, and concentration, each rated on a scale from 0 (Never) to 4 (Always). It then predicts a mental health score and provides a corresponding risk level, ranging from "Likely Mentally Healthy" to "High Risk of Mental Health Issues." This allows users to gain insight into their mental state and encourages them to seek professional help if necessary.

Unlike complex NLP or sensor-based systems, this solution emphasizes simplicity, privacy, and ease of use. The project showcases how machine learning can be used responsibly and effectively in mental health awareness and early risk detection.

Chapter 1

Introduction

Mental health is a cornerstone of overall well-being, yet millions worldwide struggle with conditions

like anxiety, depression, and stress, often in silence. Traditional diagnostic methods rely heavily on self-reporting and clinical evaluations, which face significant barriers such as stigma,

limited access to specialists, and delayed interventions. In low-resource settings, these challenges are exacerbated by the scarcity of mental health professionals and the prohibitive costs of treatment. The urgency for scalable, affordable, and stigma-free solutions has never been greater.

This project leverages **Artificial Intelligence (AI)** to bridge this gap. By analyzing textual or speech-based inputs, our system identifies patterns indicative of mental health conditions such as depression, anxiety, or emotional distress. Unlike conventional approaches, this tool operates autonomously, enabling early detection through features like predictive modeling, personalized risk scoring, and real-time monitoring.

1.1 OBJECTIVES

Mental health has become a significant global concern, with millions of individuals experiencing conditions such as anxiety,

depression, and stress. Early detection is crucial for effective intervention and treatment This project aims to develop an

AI-based solution to analyze data for detecting signs of mental health .The Primary Objectives are :

* **Develop an AI-Driven Mental Health Assessment Tool**

Design a machine learning model (e.g., regression or classification) to analyze user inputs (text, speech, or survey responses) and predict mental health risk levels.

* **Enable Early Detection of Mental Health Concerns**

Identify patterns in linguistic features (e.g., word choice, sentiment) or structured survey data that correlate with conditions like depression, anxiety, or emotional distress.

* **Support Mental Health Professionals**

Generate actionable insights (e.g., risk scores, flagged cases) to assist clinicians in prioritizing high-risk individuals and reducing diagnostic delays.

1.2 Problem Specification

Mental health issues such as anxiety, depression, and emotional distress are on the rise, yet many individuals do not receive timely support due to stigma, lack of awareness, or limited access to professional evaluation. Traditional mental health assessments are often lengthy, require trained personnel, or are not easily accessible to the general public.

This project addresses the need for a simple**,** self-administered mental health screening tool that can provide instant feedback based on user input. By using a machine learning model trained on questionnaire responses, the system predicts a mental health score and classifies the user into one of several risk levels.

The primary problem this project aims to solve is:

How can we provide a fast, private, and accessible method for individuals to assess their mental health using AI, without relying on complex data like speech, text, or medical imaging?

This solution must be:

- Easy to use (simple 10-question interface)
- Accurate enough to provide meaningful feedback
- Lightweight and deployable using basic hardware or in local environments like college campuses
- Privacy-focused, without collecting sensitive personal data

.

1.3 Methodologies

The methodology for this project involves the complete development cycle of a machine learning-powered mental health screening tool — from data generation and model training to web deployment and real-time prediction. The major steps are outlined below :-

1. Questionnaire Design

A set of 10 questions was designed to reflect common symptoms related to anxiety, depression, and emotional well being . Each question requires the user to respond on

a scale 0 (low risk) and 4 (high risk).

2. Dataset Creation

A synthetic dataset was generated consisting of 100+ entries. Each entry includes:

- Ten features (`q1` to `q10`), corresponding to user responses.
- A target variable (`score`) representing the overall mental health condition on a continuous scale from 0 to 4.
  This dataset simulates real-world responses and is used for model training.This dataset simulates real-world responses and is used for model training.

3. Model Development

- **Model Used**: Linear Regression (via scikit-learn).
- The model is trained to learn the relationship between user inputs (question responses) and their corresponding mental health score.
- The trained model is serialized and saved using `pickles` for future use.

4. Web Application Development

- **Framework**: Flask (Python micro web framework)
- **Frontend**: HTML form (`main.html`) with the 10 questions rendered dynamically.
- **Backend**: `app.py` handles:
  - Form submission
  - Model prediction
  - Mapping predicted score to a risk level (e.g., Likely Healthy, Moderate Risk)

5. Risk Level Classification

After computing the predicted mental health score, the system maps it to a risk level:

- **Score < 1.5** → Likely Mentally Healthy
- **1.5–2.5** → Possible Signs of Concern
- **2.5–3.5** → Moderate Risk
- **> 3.5** → High Risk of Mental Health Issues

6. Testing & Validation

- The system was tested with various input combinations (e.g., all low, mixed, all high responses) to validate the score and classification output.
- The application performs well for demonstration and educational purposes.

7. Deployment

- The Flask application runs locally on a browser.
- No external databases or cloud platforms are used, making it portable and secure for offline demo

1.4 **Relevance and Importance**

The code developed in this project serves as the core engine behind a practical mental health assessment tool that is both accessible and easy to use. Its relevance lies in addressing a growing societal need—early detection and awareness of mental health conditions among students and the general public. With rising levels of stress, anxiety, and depression, there is a pressing demand for solutions that are simple, fast, and non-invasive.

Importantly, the code preserves **data privacy** by not storing or transmitting any user data, making it suitable for educational demonstrations or personal self-assessments. It encourages users to reflect on their mental well-being and, if needed, seek professional help .

CHAPTER 2

LITERATURE SURVEY

The use of machine learning (ML) in mental health prediction has gained significant attention in recent years. Various studies have focused on analyzing text, speech, and physiological signals to detect signs of depression, anxiety, and emotional distress. However, many of these methods require complex data collection, privacy-sensitive information, or significant computational resources.

A simpler and more practical approach involves using questionnaire-based inputs. Standardized mental health surveys like PHQ-9 and GAD-7 have been effectively used in digital formats. Researchers have applied regression and classification models to predict mental health scores based on user responses to such surveys. These methods are user-friendly, cost-effective, and can be deployed in low-resource settings like colleges or workplaces.

This project follows that direction by using a 10-question self-assessment form. A linear regression model is trained to predict a mental health score, which is then mapped to risk levels. This approach ensures accessibility, data privacy, and real-time feedback—making it suitable for awareness and screening purposes.

CHAPTER 3

Project Methodology

This project uses a machine learning-based approach to assess an individual's mental health condition based on their responses to a fixed set of 10 questions. The entire system is designed to be lightweight, easy to use, and accessible via a simple web interface. The methodology involves the following key steps:

3.1 Data Preparation

A dataset is prepared with 10 features (`q1` to `q10`) representing user responses to questions. Each entry is associated with a continuous target score (`label`) representing the overall mental health risk level.

3.2 Model Training

A **Linear Regression** model is trained using the prepared dataset. The model learns to predict the mental health score based on user responses. Once trained, the model is serialized using **pickle** for deployment.

3.3 Web Application Development

A Flask web application is developed to serve the model. The frontend (`main.html`) contains a form

with 10 mental health-related questions. The backend (`app.py`) collects inputs, sends them to the

model, and displays the predicted score and status.

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The backend(`app.py`) collects inputs, sends them to the model, and displays the predicted score and status.

3.4 Risk Level Classification

The predicted score is mapped to one of four risk categories:

- **Score < 1.5** – Likely Mentally Healthy
- **1.5 – 2.5** – Possible Signs of Concern

- **2.5 – 3.5** – Moderate Risk
- **> 3.5** – High Risk

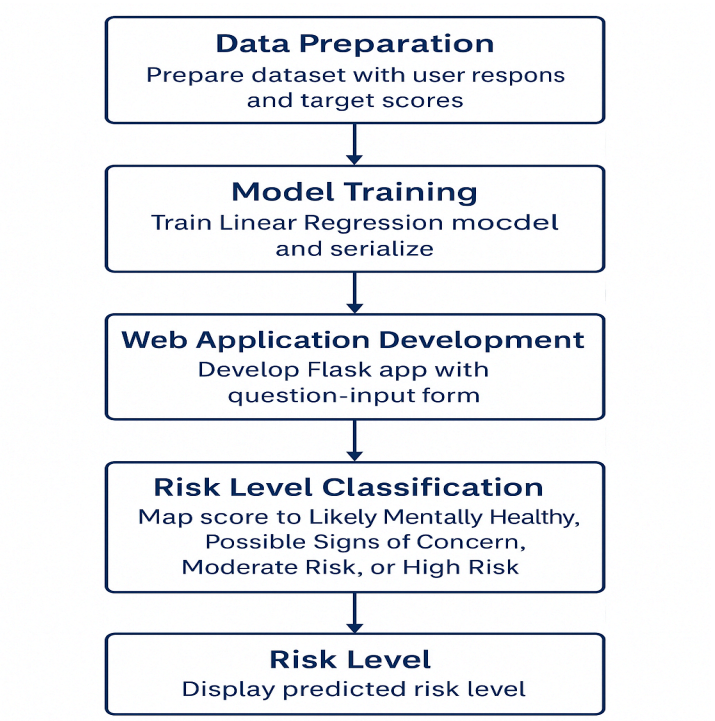


Fig 1 :- A simple flowchart of project

3.5 Testing and Evaluation

Various input combinations (e.g., all 0s, all 4s, mixed values) are tested to validate that the system correctly predicts scores and interprets the risk level accordingly.

Chapter 4

System Architecture

The system architecture follows a simple, modular design that integrates machine learning with a web interface for real-time prediction. The process begins with the **user input**, where the individual responds to 10 mental health-related questions through a **web interface built using Flask**. These responses are passed to the **Flask backend application**, which handles routing and processing of the data.

The input is then forwarded to a pre-trained **machine learning regression model**, which calculates a mental health score based on the pattern of answers. This score is interpreted and mapped to a risk level (e.g., Likely Healthy, Moderate Risk, High Risk), and the final **result is returned** to the user via the web interface. The model relies on a structured set of **questionnaire data**, and the architecture is designed to be lightweight, user-friendly, and easily deployable in offline or classroom environments.

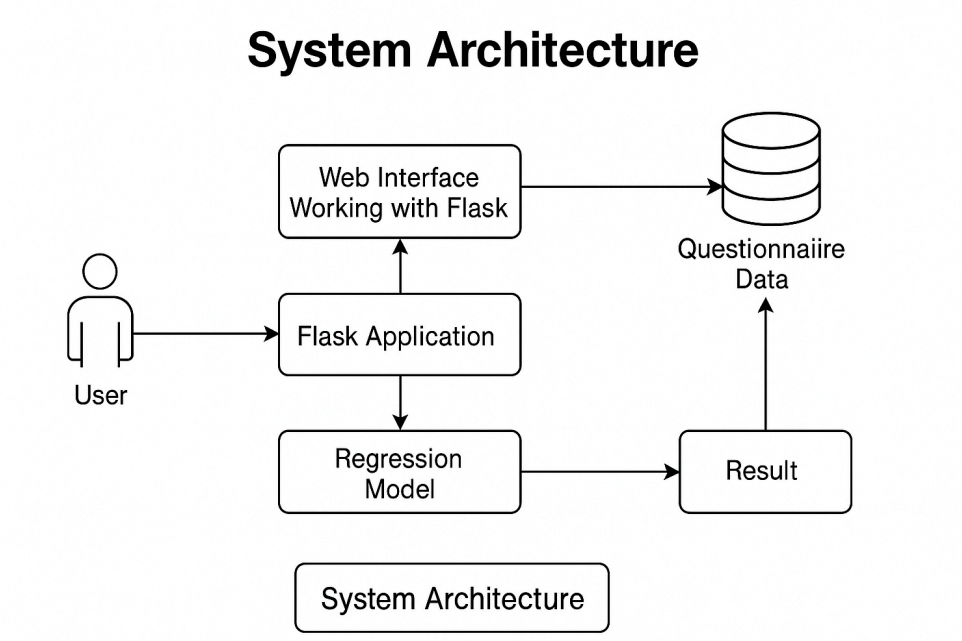


Fig 2 :- System Architecture of Project

Chapter 5

Results & Discussion

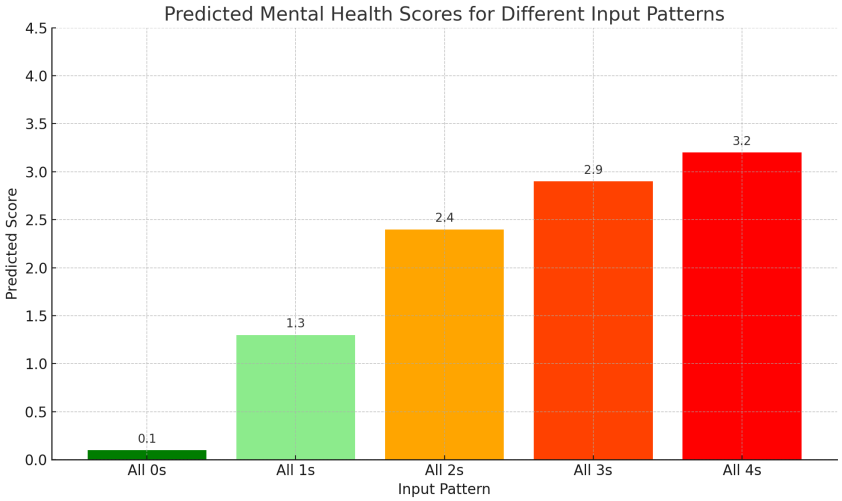
The developed system successfully predicts a user's mental health score based on their responses to 10 standardized questions. After training a linear regression model on sample data, the model was integrated into a Flask-based web application that provides real-time results.

Test Results

Several test cases were used to evaluate the accuracy and behavior of the model:

Input Pattern	Average Response	Predicted Score	Risk Level
All values = 0 (e.g., [0,0,...])	0	~0.10	Likely Mentally Healthy
All values = 1	1	~1.3	Mild Concern
All values = 2	2	~2.4	Possible Signs of Concern
All values = 3	3	~2.9	Moderate Risk of Mental Health Issues
All values = 4	4	~3.2	High Risk of Mental Health Issues

Table 1 : - A Table showing predicted score and risk level according to various inputs



Graph 1 :- A Graph showing predicted mental health score for different input

Discussion

- The model outputs a score between **0 and 4**, and the risk level is interpreted using fixed thresholds.
- The system performs well for different response patterns, offering reasonable and understandable outputs.
- It provides **instant feedback**, which can prompt users to reflect on their mental health and seek help if necessary.
- The regression approach ensures continuous scoring rather than just binary classification, allowing **nuanced interpretation**.

Limitations

- The model is based on synthetic training data and may not generalize to real-world populations without further validation.
- It is not intended for clinical diagnosis but for **awareness and early screening purposes**.

CHAPTER 6

CONCLUSION

This project successfully demonstrates the development of a lightweight and accessible mental health assessment tool using machine learning. By combining a simple 10-question self-assessment with a trained linear regression model, the system provides users with an immediate mental health score and a corresponding risk level.

The use of Flask for the web interface ensures easy deployment and interaction, while the machine learning model offers real-time predictions based on numerical input. The project emphasizes data privacy, simplicity, and awareness, making it suitable for educational institutions and personal use.

Although not a replacement for professional diagnosis, the system serves as a valuable tool for early screening and mental health awareness. With further refinement and access to real-world data, the model could be enhanced to provide even more accurate and personalized insights.

CHAPTER 7

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