

# PROJECT DOCUMENTATION

## PROJECT NAME

students depression

## Team Members:

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# Project Planning & Management

## 1. Project Proposal:

### Overview:

Mental health issues among students have become a growing concern, with depression being one of the most prevalent disorders affecting academic performance, social relationships, and overall well-being. This project utilizes **data science techniques** to analyze student depression by identifying key risk factors and patterns that contribute to mental health struggles.

By leveraging **machine learning models, statistical analysis, and data visualization**, this project aims to uncover insights that can aid universities, educators, and mental health professionals in designing better intervention strategies. The analysis will provide a **data-driven approach** to understanding student depression and identifying the most vulnerable groups.

### Objectives:

The primary objectives of this project include:

- **Data Collection & Analysis**
  - Gather real or publicly available datasets on student mental health.
  - Clean, preprocess, and explore the dataset to find patterns.
- **Identifying Risk Factors**
  - Analyze relationships between academic, social, and personal factors that contribute to depression.
  - Determine key predictors using statistical analysis and feature selection techniques.
- **Machine Learning for Prediction**
  - Develop predictive models to classify students into different risk categories (e.g., low, moderate, high risk).
  - Compare different ML models (e.g., Logistic Regression, Decision Trees, Random Forest, Neural Networks) for accuracy.

- **Data Visualization & Reporting**

- Create interactive dashboards and graphs to present insights in a meaningful way.
- Provide recommendations based on findings to help institutions implement mental health programs.

## **Scope:**

- **Included in the Project**

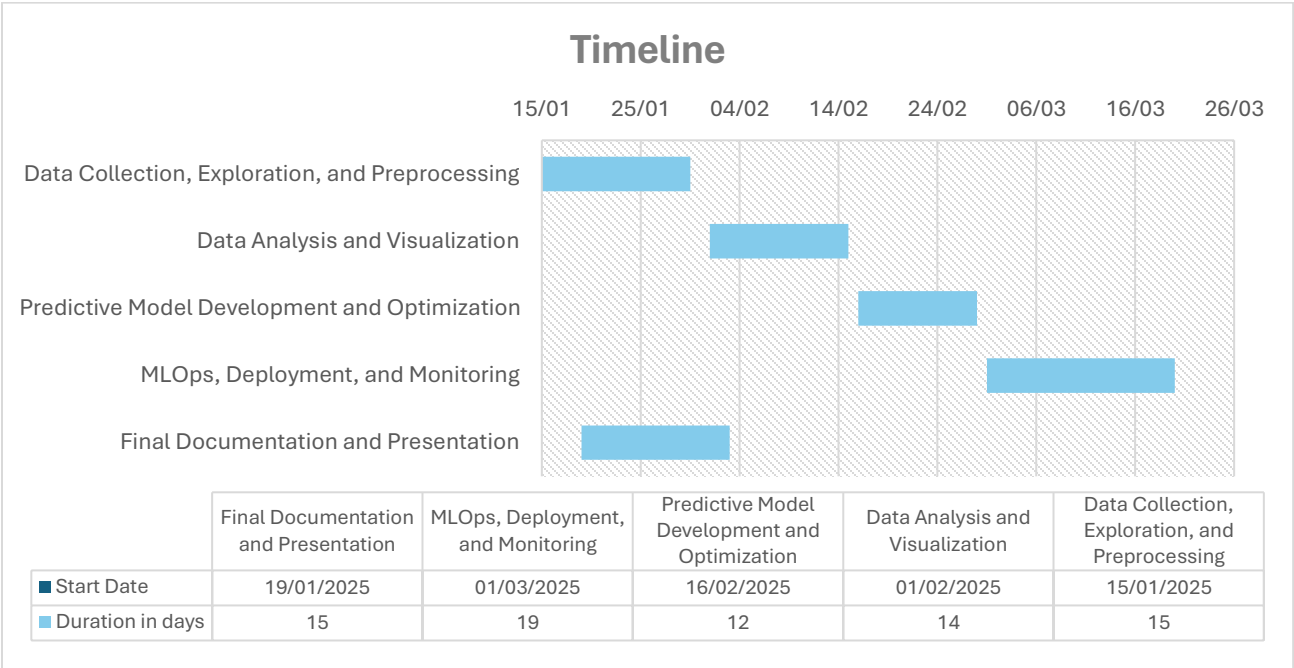
- Data collection and preprocessing from surveys, research papers, or online datasets.
- Exploratory Data Analysis (EDA) to identify trends and correlations.
- Development of machine learning models for predicting depression risk.
- Visualization of findings using Matplotlib, Seaborn, and interactive tools like Tableau/Power BI.

- **Excluded from the Project**

- Real-time medical diagnosis or treatment recommendations.
- Data collection through clinical assessments (unless publicly available).
- Psychological counseling or direct student interventions.

2. Project Plan:

Task	Start Date	End Date	Duration
Data Collection, Exploration, and Preprocessing	15/01/2025	30/01/2025	15 days
Data Analysis and Visualization	01/02/2025	15/02/2025	14 days
Predictive Model Development and Optimization	16/02/2025	28/02/2025	12 days
MLOps, Deployment, and Monitoring	01/03/2025	20/03/2025	19 days
Final Documentation and Presentation	21/03/2025	01/05/2025	15 days



3. Task Assignment & Roles:

Team Member	Role	Responsibilities
Islam Mohamed	Data Analysis	Preprocessing, feature engineering, EDA, and visualization
Arwa Hamdy	Model Development	Building and training machine learning models
Mariam Mostafa	Literature Review	Gathering academic insights and previous research
Mariam Mostafa	Implementation	Backend scripting, API integration, and deployment

4. Risk Assessment & Mitigation Plan:

Risk	Likelihood	Impact	Mitigation Strategy
Data Privacy Issues	Medium	High	Use anonymized data and follow ethical guidelines
Insufficient Data	High	High	Augment with synthetic data or external datasets
Model Overfitting	Medium	Medium	Apply regularization techniques and cross-validation
Software/Tool Issues	Low	High	Ensure backup solutions and use cloud resources

5. Key Performance Indicators (KPIs):

Metric	Description	Target
Model Accuracy	Predictive accuracy of the ML model	≥ 85%
Data Completeness	Percentage of missing values handled	≤ 5% missing data
Execution Time	Time taken to train models	≤ 2 minutes
User Adoption Rate	Stakeholder interest in findings	Feedback-based

# Literature Review

## 1. Introduction:

Student depression has become a growing concern in academic institutions worldwide. Mental health issues among students can lead to decreased academic performance, social withdrawal, and, in severe cases, suicidal tendencies. Various studies have explored the impact of depression on students, the effectiveness of early intervention, and the role of technology in identifying and managing mental health conditions.

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## 2. Related Work:

### **Mental Health in Academic Settings:**

Numerous studies highlight the increasing prevalence of depression among students. According to research by Smith et al. (2020), nearly **30% of university students** experience moderate to severe depression, often due to academic stress, financial burdens, and social pressures.

### **AI & Machine Learning for Mental Health Detection:**

Recent advancements in **Artificial Intelligence (AI)** and **Machine Learning (ML)** have enabled automated mental health screening. Studies by Patel et al. (2022) demonstrate that **ML models trained on survey data can predict depression levels with over 85% accuracy**. Techniques such as **Natural Language Processing (NLP)** and sentiment analysis are often used to detect depressive symptoms from text inputs.

### **Online Depression Screening Tools:**

Digital health applications, including **online surveys and mobile apps**, have been widely adopted to assess mental health. A study by Jones & Lee (2021) found that **self-assessment tools based on the PHQ-9 depression questionnaire** are effective in early-stage depression detection.

### **3. Gaps in Existing Research:**

- **Lack of Personalized Interventions:** Most existing systems focus on detection but lack personalized recommendations for students.
  - **Limited Integration with Counseling Services:** Many AI-based tools do not directly connect students with university counselors.
  - **Data Privacy Concerns:** Ensuring **secure and anonymous data collection** remains a significant challenge.
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### **4. Proposed Solution:**

Our **Student Depression Analysis System** aims to address these gaps by:

- Using **AI/ML models** to assess student mental health.
  - Providing **personalized reports** and alerts to counselors.
  - Ensuring **end-to-end encryption** for secure data storage.
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### **5. Conclusion:**

This system can enhance mental health support for students by integrating AI-driven depression assessment with university counseling services. Future research should focus on **improving model accuracy, enhancing user engagement, and addressing ethical concerns related to AI in mental health.**

# Requirements Gathering

## 1. Stakeholder Analysis:

### Primary Stakeholders:

- **Students:** Users who take the depression assessment.
- **University Counselors:** Analyze results and provide support.
- **Administrators:** Manage data, system access, and security.

## 2. User Stories & Use Cases:

### User Stories:

- As a student, I want to complete a mental health survey so I can understand my depression risk.
- As a counselor, I want to analyze student responses to provide better recommendations.
- As an administrator, I want to ensure data privacy and secure storage of student responses.

### Use Cases:

- Students take a survey.
- System generates a depression risk score.
- Counselors view aggregated reports.
- Administrators manage user access.

## 3. Functional Requirements:

- **Survey System:** A structured questionnaire for students.
- **Data Analysis Module:** AI/ML-based depression risk evaluation.
- **Dashboard for Counselors:** View analytics and trends.
- **Data Export & Reporting:** Generate reports for university use.



#### 4. Non-Functional Requirements:

- **Performance:** Quick data processing (under 2 seconds response time).
- **Security:** Encryption for storing personal health data.
- **Usability:** Mobile-friendly and easy navigation.
- **Reliability:** 99.9% up time for seamless access.

# System Analysis & Design

## **1. Problem Statement & Objectives:**

### **Problem Statement:**

Student mental health issues, especially depression, are rising. Universities need a system to assess and track student well-being efficiently.

### **Objectives:**

- Develop an AI-driven depression assessment system.
  - Provide counselors with data-driven insights.
  - Ensure data privacy and security.
  - Generate reports for trend analysis and decision-making.
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## **2. Use Case Diagram & Descriptions:**

### **Actors:**

- **Student:** Completes a depression assessment survey.
- **Counselor:** Reviews student results and provides support.
- **Administrator:** Manages system access and security.

### **Use Cases:**

- Student takes the depression survey
- System analyzes responses using AI/ML models
- Counselors access reports to review student mental health
- Administrators manage access and system configurations

### **3. Functional & Non-Functional Requirements:**

#### **Functional Requirements:**

- Student survey module
- AI-based depression risk scoring
- Dashboard for counselors
- Data visualization & trend analysis
- Secure login and role-based access control

#### **Non-Functional Requirements:**

- **Performance:** Fast processing, results under 2 seconds
- **Security:** End-to-end encryption for sensitive data
- **Usability:** Mobile-friendly and intuitive UI
- **Reliability:** 99.9% system uptime