SUICIDAL DETECTION / PREDICTION

A MINI-PROJECT REPORT

Submitted by

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in partial fulfilment of the award of the degree

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NOV/DEC, 2024

BONAFIDE CERTIFICATE

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Certified that this mini project "**SUICIDAL DETECTION / PREDICTION**" is the bonafide work of "**MANICK VISHAL C (2116220701158)**" who carried out the project work under my supervision

SIGNATURE

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Submitted for the End semester practical examination to be held on __________________

EXTERNAL EXAMINER **INTERNAL EXAMINER**

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ABSTRACT

Suicidal behavior is a pressing global health issue, necessitating early detection and intervention to prevent potential loss of life. This study focuses on leveraging machine learning algorithms and natural language processing (NLP) to detect and predict suicidal tendencies in individuals, primarily through the analysis of social media data, clinical records, and self-reported questionnaires. We explore various predictive models, including logistic regression, support vector machines (SVM), and deep learning approaches like recurrent neural networks (RNNs) and transformers, to identify patterns of suicidal ideation. Data preprocessing techniques, such as sentiment analysis, keyword analysis, play a pivotal role in improving the accuracy of prediction. The study evaluates model performance using metrics such as precision, recall, and the F1 score to assess the trade-offs between false positives and false negatives in real-world scenarios. Our findings show that integrating linguistic, psychological, and behavioral features significantly enhances the predictive power of models, allowing for earlier identification of at-risk individuals. However, ethical concerns, such as privacy, stigmatization, and the potential for false positives, require careful consideration in the deployment of these systems.

CHAPTER 1

1.1 INTRODUCTION

Suicide is a major public health concern, with approximately 700,000 deaths worldwide each year, according to the World Health Organization (WHO). It is the second leading cause of death among individuals aged 15-29, underscoring the urgent need for effective prevention strategies. Traditional methods of suicide prevention often rely on self-reported surveys, clinical interviews, and the observation of high-risk behaviors, which can be limited in their ability to identify at-risk individuals in real time. Moreover, social stigma and limited access to mental health services often prevent individuals from seeking help.

The increasing use of digital platforms such as social media, online forums, and personal blogs has provided a new opportunity for understanding mental health and suicidal behavior. Individuals experiencing suicidal ideation often express their distress online through posts, comments, or messages, making digital data a valuable source for detecting early warning signs. This has led to a growing interest in the application of artificial intelligence (AI) and machine learning (ML) for the automatic detection and prediction of suicidal tendencies. These technologies can analyze large amounts of unstructured data, identifying patterns that may not be immediately evident to human observers.

Machine learning models, particularly those leveraging natural language processing (NLP) techniques, have shown promise in detecting subtle changes in language that may indicate suicidal ideation. By analyzing textual data for signs of hopelessness, depression, and anxiety, these models can help identify individuals who may be at risk. Additionally, deep learning approaches, such as recurrent neural networks (RNNs) and transformer models, are being employed to predict suicidal behavior by modeling the temporal evolution of an individual's mental state over time.

Despite these advancements, several challenges remain. The ethical implications of using AI to predict suicidal behavior must be carefully considered, particularly with respect to privacy, data security, and the potential for false positives. Furthermore, the accuracy of prediction models is a critical factor in their practical application, as misidentifying individuals could lead to either unnecessary interventions or missed opportunities for help.

This paper seeks to explore the potential of AI and ML models for suicidal detection and prediction, evaluate their effectiveness, and address the ethical concerns surrounding their implementation in real-world settings.

1.2 SCOPE OF THE WORK

The scope of this research focuses on the development and evaluation of machine learning and natural language processing (NLP) models for the detection and prediction of suicidal ideation. The work aims to explore both the technical and ethical dimensions of using artificial intelligence (AI) for suicide prevention, with an emphasis on the following key areas:

1. **Data Sources**: The study primarily focuses on analyzing textual data from social media platforms (e.g., Twitter, Reddit), clinical records, and self-reported questionnaires. Social media data is especially relevant due to its real-time nature and the candid expressions of mental health concerns by users. Noisy and unstructured text, which often contains informal language, abbreviations, and emotional expressions, will be handled using NLP techniques.
2. **Model Development**: The research investigates various machine learning models, including logistic regression, support vector machines (SVMs), and deep learning architectures like recurrent neural networks (RNNs), transformers, and convolutional neural networks (CNNs). These models are used to detect signs of suicidal ideation based on linguistic, behavioral, and temporal patterns in the data. The study also explores sentiment analysis, keyword extraction, and topic modeling to enhance model performance.
3. **Feature Extraction**: Both linguistic and psychological features will be extracted from the textual data to identify patterns associated with suicidal ideation. These features include but are not limited to emotion-based words, depression markers, expressions of hopelessness, and changes in engagement over time (e.g., frequency of posts, tone shifts).

4. **Model Evaluation**: The effectiveness of the models will be assessed using common performance metrics such as accuracy, precision, recall, and F1 score. Special emphasis will be placed on optimizing the balance between false positives and false negatives to ensure the responsible application of these models. Cross-validation techniques will be used to avoid overfitting and ensure the models generalize well across diverse data sets.

5. **Ethical Considerations**: Recognizing the sensitivity of mental health data, this research addresses ethical concerns such as privacy, consent, and the potential for stigmatization. Additionally, the potential consequences of false predictions, including both false positives (incorrectly flagging someone as suicidal) and false negatives (failing to identify someone at risk), will be explored in detail.
6. **Real-World Application**: The paper outlines potential pathways for integrating AI-based suicide detection models into existing mental health systems. It discusses how these tools could support mental health professionals by providing real-time alerts for at-risk individuals while emphasizing the need for human oversight and clinical validation before intervention.

The scope is intentionally limited to textual analysis and does not cover non-textual modalities, such as video, voice, or biometric data. Furthermore, while this work provides a foundation for AI-driven suicide prevention, the practical deployment of such systems in healthcare or social media platforms requires collaboration with policymakers, mental health practitioners, and data scientists.

1.3 AIM & OBJECTIVES OF THE PROJECT

The primary aim of this project is to develop and assess machine learning and natural language processing (NLP) models for the detection and prediction of suicidal ideation in individuals. The goal is to leverage online behavioral data to facilitate timely interventions and enhance suicide prevention efforts.

- **Conduct a Literature Review:** Review existing literature on the use of machine learning and NLP techniques for suicidal ideation detection, identifying gaps and challenges in current methodologies.

- **Data Acquisition and Preparation:** Identify and collect relevant datasets, including social media posts, clinical records, and self-reported surveys. Implement preprocessing techniques to clean and standardize the data, ensuring it is suitable for analysis.

- **Feature Extraction:** Develop a framework for extracting relevant linguistic and psychological features from the textual data, such as sentiment scores, keyword frequency, and behavioral patterns indicative of suicidal ideation.

- **Model Development:** Design and implement various machine learning models, including traditional algorithms (e.g., logistic regression, support vector machines) and advanced deep learning architectures (e.g., recurrent neural networks, transformers), to analyze the data for indicators of suicidal tendencies.

- **Model Evaluation and Comparison:** Evaluate the performance of the developed models using metrics such as accuracy, precision, recall, and F1 score. Conduct cross-validation to ensure model robustness and generalizability across diverse datasets.

- **Address Ethical Considerations:** Examine the ethical implications of deploying AI-based models in mental health contexts, focusing on issues of privacy, consent, and the potential impact on individuals' well-being. Propose guidelines for responsible use in real-world applications.

- **Implementation Recommendations:** Provide actionable recommendations for integrating predictive models into mental health systems and social media platforms, emphasizing the importance of human oversight in interpreting model outputs and making intervention decisions.

- **Outline Future Research Directions:** Identify potential areas for further research, including the exploration of multimodal data sources (e.g., voice, video) and ongoing improvements in predictive algorithms to enhance the efficacy of suicide prevention initiatives.

CHAPTER 2

SYSTEM SPECIFICATIONS

The proposed system for suicidal detection and prediction will leverage machine learning and natural language processing (NLP) techniques to analyze textual data and identify indicators of suicidal ideation. The following specifications outline the essential components and requirements of the system:

2.1 HARDWARE SPECIFICATIONS

Processor:

- Minimum: Intel Core i5 or equivalent
- Recommended: Intel Core i7 or equivalent for faster processing and model training

RAM:

- Minimum: 8 GB
- Recommended: 16 GB or more for handling larger datasets and parallel processing

Storage:

- Minimum: 256 GB SSD
- Recommended: 512 GB SSD or larger to accommodate data storage and software requirements

Graphics Processing Unit (GPU):

- Minimum: NVIDIA GeForce GTX 1050 or equivalent (for basic deep learning tasks)
- Recommended: NVIDIA GeForce RTX 2060 or higher (for advanced deep learning model training)

2.2 SOFTWARE SPECIFICATIONS

Operating System

- Windows 10/11, macOS, or a Linux distribution

Programming Languages

- Python (primary language for model development and analysis)
- R (optional, for statistical analysis)

Libraries and Frameworks:

- Machine Learning:
  - ➢ TensorFlow or PyTorch for deep learning
- Natural Language Processing:
  - ➢ NLTK (Natural Language Toolkit)
  - ➢ Hugging Face Transformers for advanced NLP models
- Data Manipulation and Visualization:
  - ➢ Matplotlib or Seaborn

Database Management:

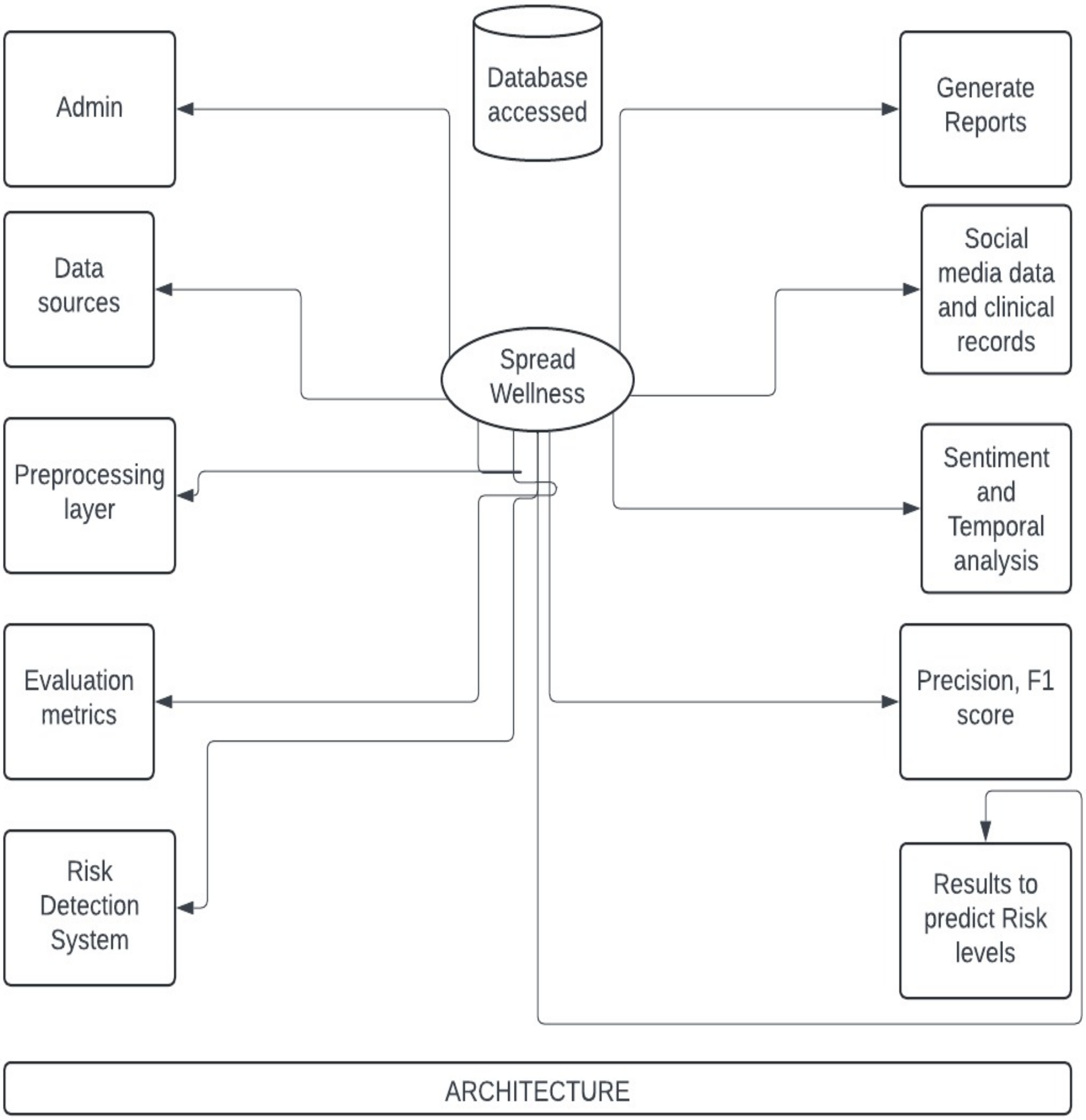
- SQL or NoSQL database systems (e.g., PostgreSQL, MongoDB) for storing and retrieving data

Development Environment:

- Integrated Development Environment (IDE) such as Jupyter Network, PyCharm, or Visual Studio Code

CHAPTER 3

ARCHITECTURE DIAGRAM



CHAPTER 4

MODULE DESCRIPTION

The system for suicidal detection and prediction will consist of several interconnected modules, each responsible for specific tasks in the data processing pipeline. This module description provides a clear outline of the system's architecture, detailing the responsibilities and key features of each module. Each module plays a vital role in the overall functionality of the system, ensuring effective data collection, processing, and prediction for suicidal ideation detection.

- **Data Collection Module**

This module is responsible for gathering data from various sources, including social media platforms, clinical records, and self-reported questionnaires. It will utilize web scraping techniques and APIs to collect relevant text data.

Integration with APIs (e.g., Twitter API, Reddit API) for real-time data retrieval. Automated scraping of online forums and blogs where individuals discuss mental health issues. Data storage in a structured format (e.g., CSV, JSON) for further processing.

- **Data Preprocessing Module**

The preprocessing module cleans and prepares the collected data for analysis. This step is crucial to ensure the quality and relevance of the data used in model training.

Text normalization (e.g., lowercasing, removing special characters). Tokenization and stop-word removal to enhance the quality of textual data. Handling missing values and filtering out irrelevant content. Sentiment analysis to determine the emotional tone of the text.

- **Feature Extraction Module**

This module extracts meaningful features from the preprocessed text data, converting it into a numerical format suitable for machine learning models.

Implementation of techniques such as Term Frequency-Inverse Document Frequency (TF-IDF) and Word Embeddings (e.g., Word2Vec, GloVe) for vector representation. Extraction of linguistic features (e.g., n-grams, part-of-speech tagging) and psychological features (e.g., indicators of depression, hopelessness). Generation of additional features based on user engagement metrics (e.g., posting frequency, comment sentiment).

- **Model Development Module**

This module is responsible for developing and training machine learning and deep learning models to detect and predict suicidal ideation based on the extracted features.Implementation of various algorithms, including logistic regression, SVMs, RNNs, and transformer models. Hyperparameter tuning and model optimization to enhance performance. Cross-validation techniques to ensure model robustness and prevent overfitting.

- **Model Evaluation Module**

The evaluation module assesses the performance of the trained models using various metrics and validation techniques.Calculation of performance metrics such as accuracy, precision, recall, F1 score, and AUC-ROC. Generation of confusion matrices and ROC curves for visual representation of model performance. Comparative analysis of different models to identify the most effective approach for detecting suicidal ideation.

- **Ethics and Compliance Module**

This module addresses ethical considerations and compliance with legal standards related to mental health data and AI usage.Implementation of data anonymization techniques to protect user privacy. Documentation of ethical guidelines and best practices for responsible AI deployment. Assessment of potential biases in data and model predictions to mitigate risks of stigmatization.

- **User Interface Module**

The user interface module provides a web-based dashboard for users to interact with the system, visualize results, and input data.User-friendly dashboard displaying model predictions and analytics. Features for uploading text data and entering survey responses.Visualization tools (e.g., graphs, charts) to represent data insights and trends.

- **Reporting and Feedback Module**

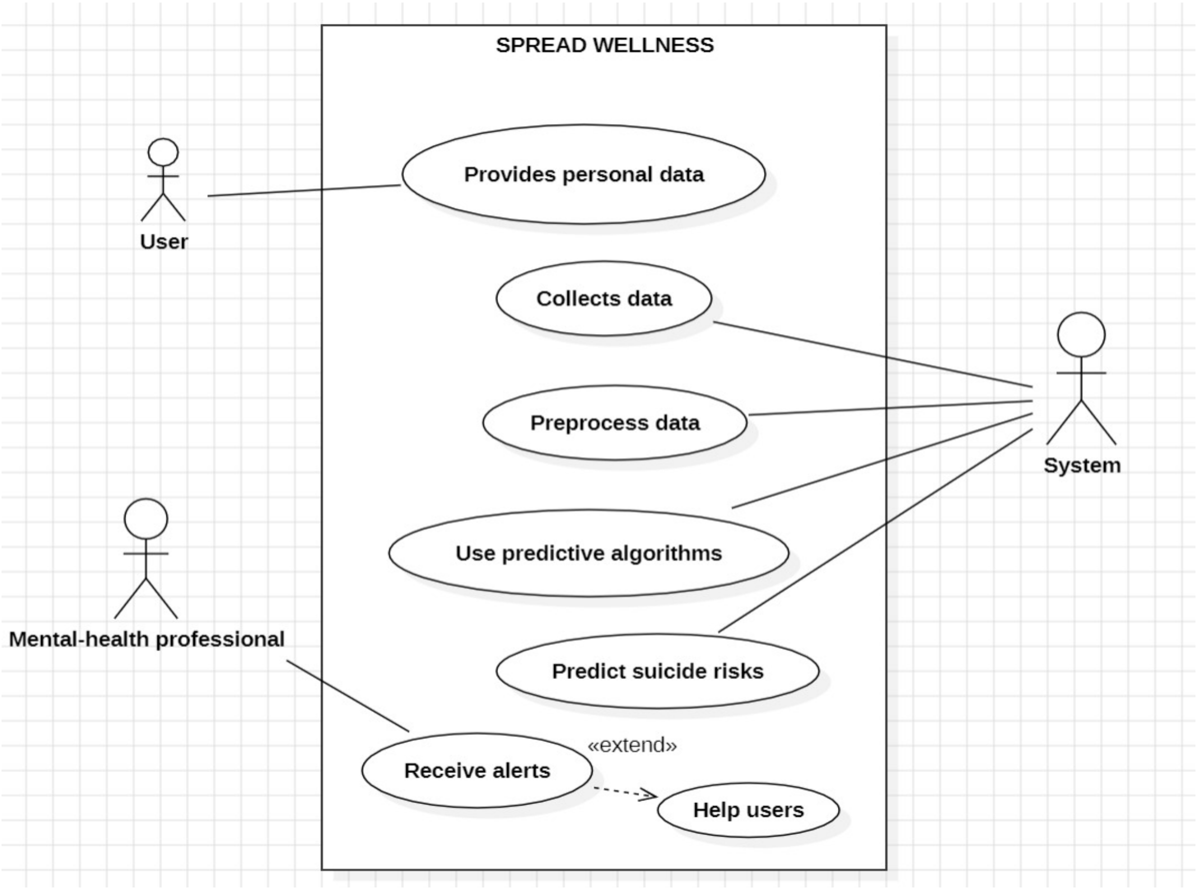
This module generates reports on model performance and allows users to provide feedback on the predictions made by the system.Automated generation of performance reports summarizing model accuracy and prediction outcomes. Feedback mechanisms for users to report false positives or negatives, which can be used to refine the models further. Continuous learning capability to improve model predictions based on user feedback and new data.

CHAPTER 5

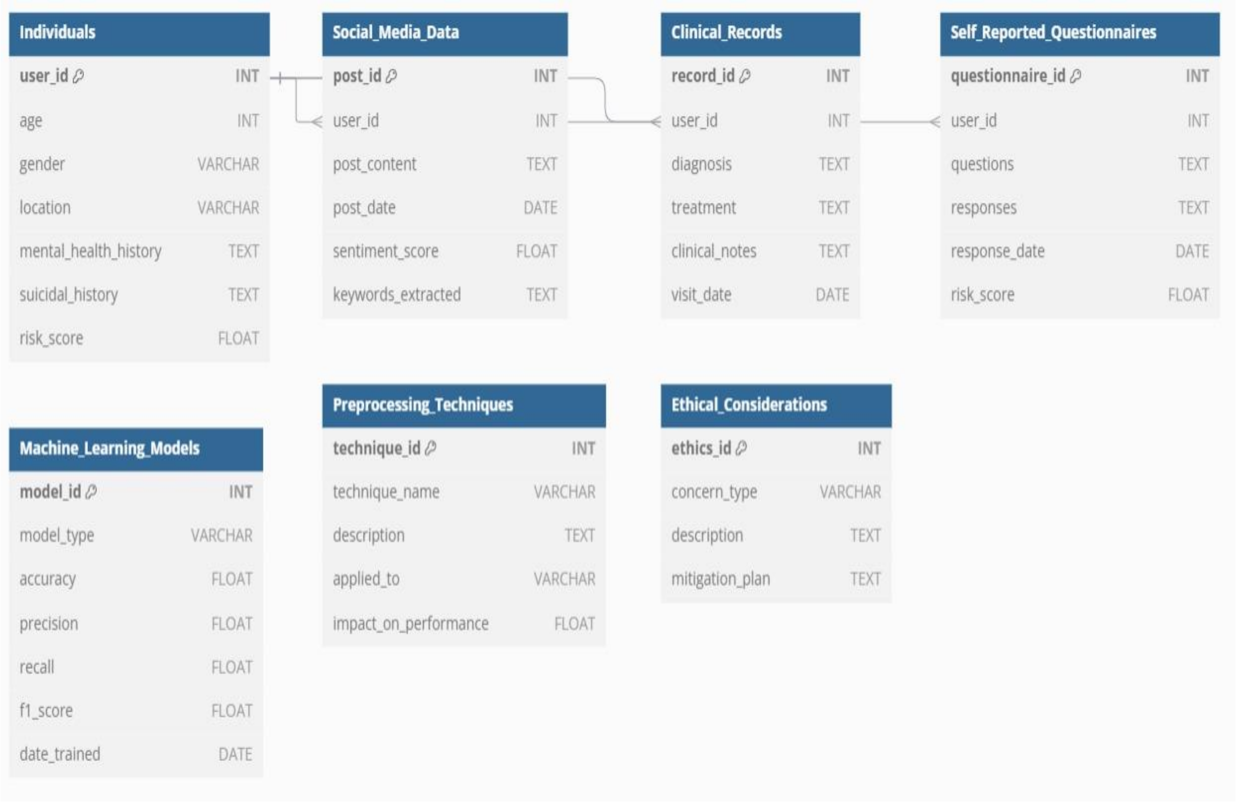
SYSTEM DESIGN

The system for suicidal detection and prediction is designed as a modular and scalable architecture, ensuring efficient data collection, preprocessing, model training, and real-time predictions. The design is structured into layers, each representing different stages of the data pipeline workflow.

5.1 USE CASE DIAGRAM



5.2 ENTITY-RELATIONSHIP DIAGRAM



Individuals	
user_id	INT
age	INT
gender	VARCHAR
location	VARCHAR
mental_health_history	TEXT
suicidal_history	TEXT
risk_score	FLOAT

Social_Media_Data	
post_id	INT
user_id	INT
post_content	TEXT
post_date	DATE
sentiment_score	FLOAT
keywords_extracted	TEXT

Clinical_Records	
record_id	INT
user_id	INT
diagnosis	TEXT
treatment	TEXT
clinical_notes	TEXT
visit_date	DATE

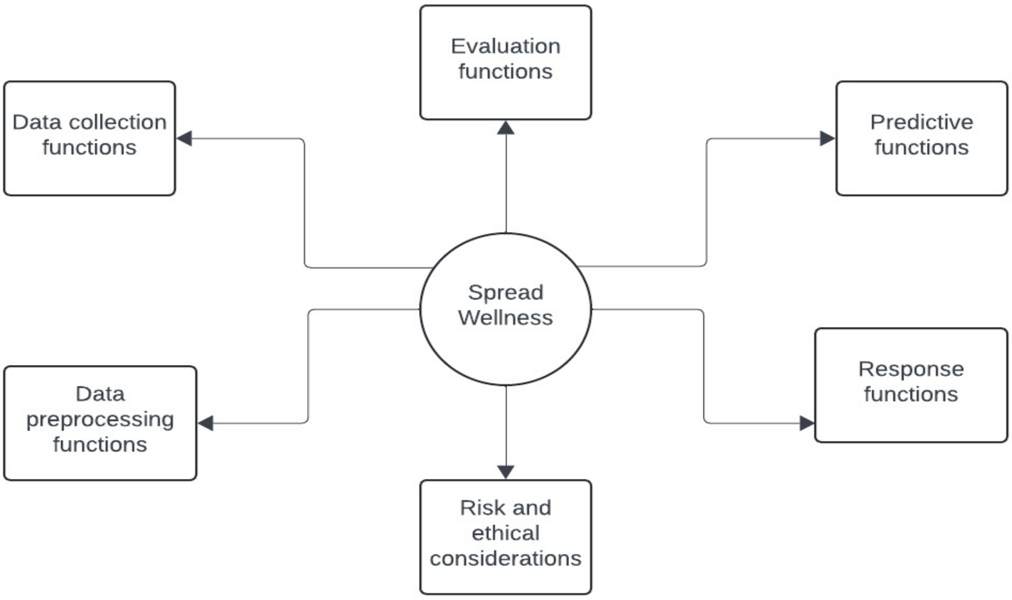
Self_Reported_Questionnaires	
questionnaire_id	INT
user_id	INT
questions	TEXT
responses	TEXT
response_date	DATE
risk_score	FLOAT

Machine_Learning_Models	
model_id	INT
model_type	VARCHAR
accuracy	FLOAT
precision	FLOAT
recall	FLOAT
f1_score	FLOAT
date_trained	DATE

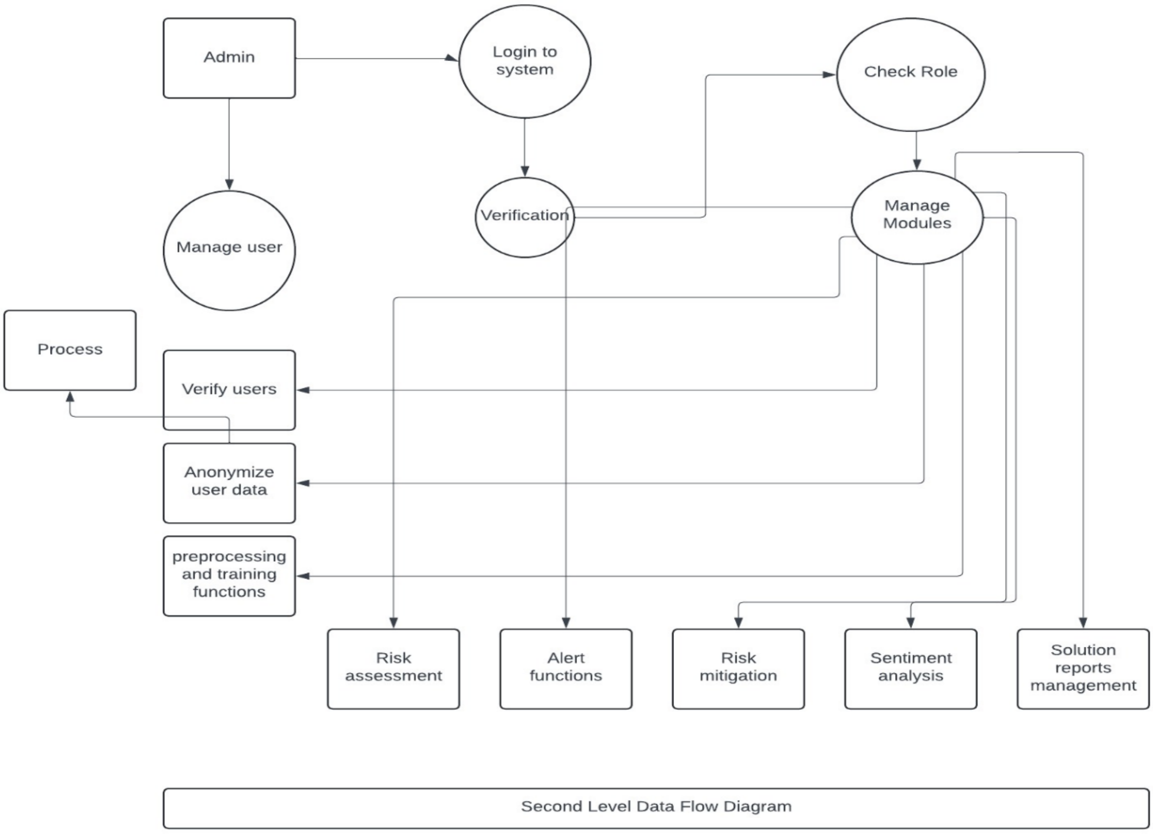
Preprocessing_Techniques	
technique_id	INT
technique_name	VARCHAR
description	TEXT
applied_to	VARCHAR
impact_on_performance	FLOAT

Ethical_Considerations	
ethics_id	INT
concern_type	VARCHAR
description	TEXT
mitigation_plan	TEXT

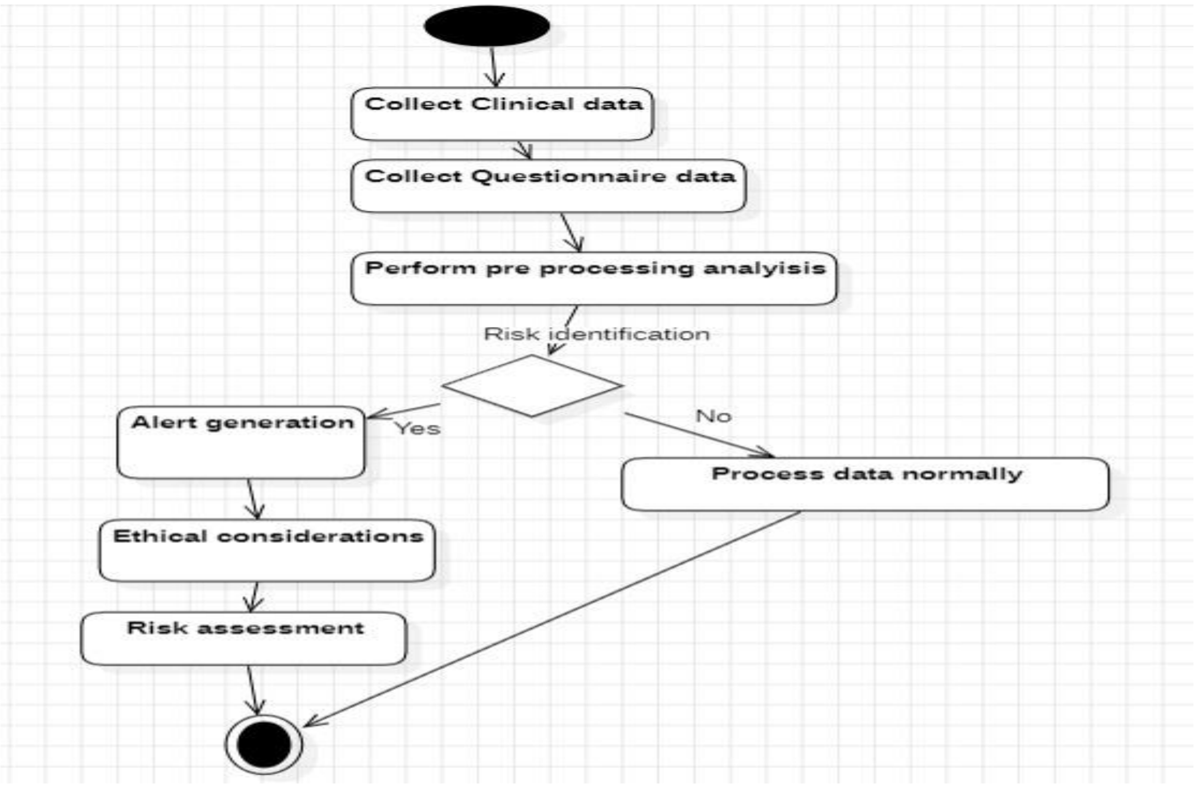
5.3 DATA FLOW DIAGRAM


Evaluation functions
Data collection functions
Predictive functions
Spread Wellness
Response functions
Data preprocessing functions
Risk and ethical considerations

First Level Data Flow Diagram



5.4 ACTIVITY DIAGRAM



CHAPTER 6

SAMPLE CODING

#login.html

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>Login Form</title>
  <!-- Bootstrap 5 CSS -->
  <link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0 alpha1/dist/css/bootstrap.
min.css"  rel="stylesheet">
  <style>
    body {
      background-color: rgb(239, 239, 239);
      display: flex;
      justify-content: center;
      align-items: center;
      height: 100vh;
      margin: 0;
    }
    .login-container {
      background-color: rgb(255, 255, 255);
      padding: 3rem;
      border-radius: 15px;
      box-shadow: 0 4px 12px rgba(0, 0, 0, 0.1);
      width: 100%;
      max-width: 400px;
    }
```

```
.login-container h2 {
   margin-bottom: 2rem;
   font-weight: bold;
   color: #333;
}
.form-control:focus {
   border-color: #28a745;
   box-shadow: none;
}
.btn-custom {
   background-color: #28a745;
   border-color: #28a745;
}
.btn-custom:hover {
   background-color: #218838;
   border-color: #218838;
}
.error-msg {
   color: red;
   font-size: 0.9rem;
}
.links-container {
   margin-top: 1rem;
   text-align: center;
}
.links-container a {
   text-decoration: none;
   color: #28a745;
```

```
        }
        .links-container a:hover {
            text-decoration: underline;
        }
    </style>
</head>
<body>
    <div class="login-container">
        <h2 class="text-center">Login</h2>
        <form id="loginForm" method="POST" action="login.php" novalidate>
            <div class="mb-3">
                <label for="username" class="form-label"><b>Username</b></label>
                <input type="text" class="form-control" id="username" name="username" placeholder="Enter your username" required>
                <div id="usernameError" class="error-msg"></div>
            </div>
            <div class="mb-3">
                <label for="password" class="form-label"><b>Password</b></label>
                <input type="password" class="form-control" id="password" name= "password" placeholder="Enter your password" required>
                <div id="passwordError" class="error-msg"></div>
            </div>
            <button type="submit" class="btn btn-custom w-100">Login</button>
        </form>
        <div class="links-container">
            <a href="forgot_password.html">Forgot Password?</a><br>
            <a href="signup.html">Don't have an account? Sign Up</a>
        </div>
    </div>
    <!-- Bootstrap 5 JS and dependencies -->
    <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0-alpha1/dist/js/bootstrap.bundle.min.js"></script>
</body>
</html>
```

# login.php

```
<?php
session_start();
$servername = "localhost";
$usernameDB = "root";
$passwordDB = " ";
$dbname = " ";
$conn = new mysqli($servername, $usernameDB, $passwordDB, $dbname);
if ($conn->connect_error) {
    die("Connection failed: " . $conn->connect_error);
}
$success = false;
if ($_SERVER["REQUEST_METHOD"] == "POST") {
    $username = $conn->real_escape_string($_POST['username']);
    $password = $conn->real_escape_string($_POST['password']);
    $sql = "INSERT INTO login (username, password) VALUES ('$username', '$password')";
    if ($conn->query($sql) === TRUE) {
        $success = true;
    } else {
        echo "Error: " . $sql . "<br>" . $conn->error;
    }
    $conn->close();
    if ($success) {
        echo "<script>
                alert('Login details inserted successfully!');
                window.location.href = 'question.html';
              </script>";
        exit();
    }
}
?>
```

#signup.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Sign Up Form</title>
    <!-- Bootstrap 5 CSS -->
    <link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0-alpha1/dist/css/bootstrap.min.css" rel="stylesheet">
    <style>
        body {
            background-color: #f0f8ff;
            display: flex;
            justify-content: center;
            align-items: center;
            height: 100vh;
            margin: 0;
        }

        .signup-container {
```

```
    background-color: white;
    padding: 3rem;
    border-radius: 15px;
    box-shadow: 0 4px 12px rgba(0, 0, 0, 0.1);
    width: 100%;
    max-width: 450px;
}
.signup-container h2 {
    margin-bottom: 2rem;
    font-weight: bold;
    color: #333;
}
.form-control:focus {
    border-color: #007bff;
    box-shadow: none;
}
.btn-custom {
    background-color: #007bff;
    border-color: #007bff;
}
.btn-custom:hover {
    background-color: #0056b3;
    border-color: #0056b3;
}
.error-msg {
    color: red;
    font-size: 0.9rem;
}
.links-container {
```

```
            margin-top: 1rem;
            text-align: center;
        }
        .links-container a {
            text-decoration: none;
            color: #007bff;
        }
        .links-container a:hover {
            text-decoration: underline;
        }
    </style>
</head>
<body>
    <div class="signup-container">
        <h2 class="text-center">Sign Up</h2>
        <form id="signupForm" novalidate>
            <div class="mb-3">
                <label for="username" class="form-label"><b>Username</b></label>
                <input type="text" class="form-control" id="username" placeholder="Enter your username" required>
                <div id="usernameError" class="error-msg"></div>
            </div>
            <div class="mb-3">
                <label for="email" class="form-label"><b>Email</b></label>
                <input type="email" class="form-control" id="email" placeholder="Enter your email" required>
                <div id="emailError" class="error-msg"></div>
            </div>
            <div class="mb-3">
        <label for="password" class="form-label"><b>Password</b></label>
        <input type="password" class="form-control" id="password" placeholder =
"Enter your password" required>
        <div id="passwordError" class="error-msg"></div>
      </div>
      <div class="mb-3">
        <label for="confirmPassword" class="form-label"><b>Confirm Password
</b></label>
        <input type="password" class="form-control" id="confirmPassword"
placeholder="Confirm your password" required>
        <div id="confirmPasswordError" class="error-msg"></div>
      </div>
      <button type="submit" class="btn btn-custom w-100">Sign Up</button>
    </form>
    <div class="links-container">
      <p class="mt-3">Already have an account? <a href="login.html">Login here
</a></p>
    </div>
  </div>
  <!-- Bootstrap 5 JS and dependencies -->
  <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0-alpha1/dist/js/bootstrap.
bundle.min.js"></script>
  <!-- JavaScript Validation -->
  <script>
    document.getElementById('signupForm').addEventListener('submit',
function(event) {
      event.preventDefault();
      let valid = true;
      const username = document.getElementById('username').value.trim();
      const usernameError = document.getElementById('usernameError');
      if (username === "") {
            usernameError.textContent = "Username is required.";
            valid = false;
        } else if (username.length < 3) {
            usernameError.textContent = "Username must be at least 3 characters long."
;
            valid = false;
        } else {
            usernameError.textContent = "";
        }
        const email = document.getElementById('email').value.trim();
        const emailError = document.getElementById('emailError');
        const emailPattern = /^[^\s@]+@[^\s@]+\.[^\s@]+$/;
        if (email === "") {
            emailError.textContent = "Email is required.";
            valid = false;
        } else if (!emailPattern.test(email)) {
            emailError.textContent = "Please enter a valid email address.";
            valid = false;
        } else {
            emailError.textContent = "";
        }
        const password = document.getElementById('password').value.trim();
        const passwordError = document.getElementById('passwordError');
        if (password === "") {
            passwordError.textContent = "Password is required.";
            valid = false;
        }

        else if (password.length < 6) {
            passwordError.textContent = "Password must be at least 6 characters long.";
            valid = false;
        } else {
            passwordError.textContent = "";
        }
        const confirmPassword = document.getElementById('confirmPassword').value.trim();
        const confirmPasswordError = document.getElementById('confirmPasswordError');
        if (confirmPassword === "") {
            confirmPasswordError.textContent = "Please confirm your password.";
            valid = false;
        } else if (confirmPassword !== password) {
            confirmPasswordError.textContent = "Passwords do not match.";
            valid = false;
        } else {
            confirmPasswordError.textContent = "";
        }
        if (valid) {
            alert('Sign Up successful!');
        }
    });
</script>
</body>
</html>
```

#forgot _ password.html

```
<!DOCTYPE html>
<html lang="en">
<head>
```

```
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Forgot Password</title>
    <!-- Bootstrap 5 CSS -->
    <link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0-alpha1/dist/css/bootstrap.min.css" rel="stylesheet">
    <style>
        body {
            background-color: #f5f5f5;
            display: flex;
            justify-content: center;
            align-items: center;
            height: 100vh;
            margin: 0;
        }
        .forgot-password-container {
            background-color: white;
            padding: 3rem;
            border-radius: 15px;
            box-shadow: 0 4px 12px rgba(0, 0, 0, 0.1);
            width: 100%;
            max-width: 450px;
        }
        .forgot-password-container h2 {
            margin-bottom: 2rem;
            font-weight: bold;
            color: #333;
        }
        .form-control:focus {
            border-color: #ff8800;
            box-shadow: none;
        }
        .btn-custom {
            background-color: #ff8800;
            border-color: #ff8800;
        }
        .btn-custom:hover {
            background-color: #e67e00;
            border-color: #e67e00;
        }
        .error-msg {
            color: red;
            font-size: 0.9rem;
        }
        .links-container {
            margin-top: 1rem;
            text-align: center;
        }
        .links-container a {
            text-decoration: none;
            color: #ff8800;
        }
        .links-container a:hover {
            text-decoration: underline;
        }
    </style>
</head>
<body>
```

```
    <div class="forgot-password-container">
        <h2 class="text-center">Forgot Password</h2>
        <form id="forgotPasswordForm" novalidate>
            <div class="mb-3">
                <label for="email" class="form-label"><b>Email</b></label>
                <input type="email" class="form-control" id="email" placeholder="Enter
your email" required>
                <div id="emailError" class="error-msg"></div>
            </div>
            <button type="submit" class="btn btn-custom w-100">Reset Password
</button>
        </form>
        <div class="links-container">
            <p class="mt-3">Remember your password? <a href="login.html">Login here
</a></p>
        </div>
    </div>
    <!-- Bootstrap 5 JS and dependencies -->
    <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0-alpha1/dist/js/bootstrap.
bundle.min.js"></script>
    <!-- JavaScript Validation -->
    <script>
        document.getElementById('forgotPasswordForm').addEventListener('submit',
function(event) {
            event.preventDefault(); // Prevent form submission
            let valid = true;
            const email = document.getElementById('email').value.trim();
            const emailError = document.getElementById('emailError');
            const emailPattern = /^[^\s@]+@[^\s@]+\.[^\s@]+$/;
            if (email === "") {
                emailError.textContent = "Email is required.";
                valid = false;
            } else if (!emailPattern.test(email)) {
                emailError.textContent = "Please enter a valid email address.";
                valid = false;
            } else {
                emailError.textContent = "";
            }
            if (valid) {
                alert('A reset link has been sent to your email!');
            }
        });
    </script>
</body>
</html>
```

#question.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Mental Health and Suicide Prediction Quiz - Part 1</title>
    <style>
        body {
            font-family: 'Arial', sans-serif;
            background-color: #eef2f3;
            display: flex;
            justify-content: center;
            align-items: center;
            min-height: 100vh;
            margin: 0;
        }
        .container {
            background-color: white;
            padding: 40px;
            border-radius: 10px;
            box-shadow: 0 4px 20px rgba(0, 0, 0, 0.1);
            max-width: 600px;
            width: 100%;
        }h1 {
            text-align: center;
            color: #333;
            margin-bottom: 30px;
        }

        label {
            font-size: 16px;
            color: #333;
        }
        input[type="number"], select, input[type="radio"] {
            margin-top: 5px;
            margin-bottom: 20px;
            width: 100%;
            padding: 10px;
            border: 1px solid #ccc;
            border-radius: 5px;
            font-size: 16px;
        }
```

```
        select {
            -webkit-appearance: none;
            -moz-appearance: none;
            appearance: none;
            background: url('data:image/svg+xml;charset=UTF-8,%3Csvg xmlns%3D%27http://www.w3.org/2000/svg%27 width%3D%2716%27 height%3D%2716%27 viewBox%3D%270 0 16 16%27 fill%3D%27%23000%27%3E%3Cpath fill-rule%3D%27evenodd%27 d%3D%27M1.5 5a.5.5 0 0 1 .832-.374l5.5 5.5a.5.5 0 0 1-.664.748L1.5 5.748V5z%27/%3E%3C/svg%3E') no-repeat right;
            background-size: 12px;
        }
        input[type="radio"] {
            width: auto;
            margin-right: 10px;
        }
        button {
            width: 100%;
            padding: 15px;
            background-color: #4CAF50;
            color: white;
            border: none;
            border-radius: 5px;
            font-size: 16px;
            cursor: pointer;
            transition: background-color 0.3s;
        }
        button:hover {
            background-color: #45a049;
        }
        @media (max-width: 600px) {
            .container {
                padding: 20px;
            }
            input[type="number"], select, input[type="radio"] {
                font-size: 14px;
                padding: 8px;
            }
            button {
                padding: 12px;
                font-size: 14px;
            }
        }
    </style>
</head>
<body>
<div class="container">
    <h1>Mental Health and Suicide Prediction Quiz - Part 1</h1>
    <form id="mentalHealthQuizPart1">
        <div>
            <label for="age">Age:</label><br>
            <input type="number" id="age" name="age" min="15" max="100" placeholder="Enter your age" required>
        </div>
        <div>
            <label for="gender">Gender:</label><br>
            <select id="gender" name="gender" required>
                <option value="">Select your gender...</option>
                <option value="male">Male</option>
                <option value="female">Female</option>
                <option value="other">Other</option>
                <option value="preferNotToSay">Prefer not to say</option>
            </select>
        </div>
        <!-- Existing Questions -->
        <div>
            <label>Over the last 2 weeks, how often have you felt down, depressed, or hopeless?</label><br>
            <input type="radio" id="notAtAll" name="depressionFrequency" value="0" required>
            <label for="notAtAll">Not at all</label><br>
            <input type="radio" id="severalDays" name="depressionFrequency" value="1">
            <label for="severalDays">Several days</label><br>
            <input type="radio" id="moreThanHalf" name="depressionFrequency" value="2">
            <label for="moreThanHalf">More than half the days</label><br>
            <input type="radio" id="nearlyEveryDay" name="depressionFrequency" value="3">
            <label for="nearlyEveryDay">Nearly every day</label>
        </div>
        <div>
            <label>Over the last 2 weeks, how often have you had thoughts of hurting yourself ?</label><br>
            <input type="radio" id="notAtAllHarm" name="selfHarmThoughts" value="0" required>
            <label for="notAtAllHarm">Not at all</label><br>
            <input type="radio" id="severalDaysHarm" name="selfHarmThoughts" value="1">
            <label for="severalDaysHarm">Several days</label><br>
            <input type="radio" id="moreThanHalfHarm" name="selfHarmThoughts" value="2">
            <label for="moreThanHalfHarm">More than half the days</label><br>
            <input type="radio" id="nearlyEveryDayHarm" name="selfHarmThoughts" value="3">
            <label for="nearlyEveryDayHarm">Nearly every day</label>
        </div>
        <!-- New Questions -->
        <div>
            <label>Over the last 2 weeks, how often have you felt anxious or on edge?</label><br>
            <input type="radio" id="notAtAllAnxious" name="anxietyFrequency" value="0" required>
            <label for="notAtAllAnxious">Not at all</label><br>
            <input type="radio" id="severalDaysAnxious" name="anxietyFrequency" value="1">
            <label for="severalDaysAnxious">Several days</label><br>
            <input type="radio" id="moreThanHalfAnxious" name="anxietyFrequency" value="2">
            <label for="moreThanHalfAnxious">More than half the days</label><br>
            <input type="radio" id="nearlyEveryDayAnxious" name="anxietyFrequency" value="3">
            <label for="nearlyEveryDayAnxious">Nearly every day</label>
        </div>
        <div>
            <label>Over the last 2 weeks, how often have you felt you were a failure ?</label><br>
            <input type="radio" id="notAtAllWorthless" name="worthlessnessFrequency" value="0" required>
            <label for="notAtAllWorthless">Not at all</label><br>
            <input type="radio" id="severalDaysWorthless" name="worthlessnessFrequency" value="1">
```

```
      <label for="severalDaysWorthless">Several days</label><br>
      <input type="radio" id="moreThanHalfWorthless" name="worthlessnessFrequency" value="2">
      <label for="moreThanHalfWorthless">More than half the days</label><br>
      <input type="radio" id="nearlyEveryDayWorthless" name="worthlessnessFrequency" value="3">
      <label for="nearlyEveryDayWorthless">Nearly every day</label>
    </div>
    <div>
      <label>Over the last 2 weeks, how often have you had trouble sleeping ?</label><br>
      <input type="radio" id="notAtAllSleep" name="sleepFrequency" value="0" required>
      <label for="notAtAllSleep">Not at all</label><br>
      <input type="radio" id="severalDaysSleep" name="sleepFrequency" value="1">
      <label for="severalDaysSleep">Several days</label><br>
      <input type="radio" id="moreThanHalfSleep" name="sleepFrequency" value="2">
      <label for="moreThanHalfSleep">More than half the days</label><br>
      <input type="radio" id="nearlyEveryDaySleep" name="sleepFrequency" value="3">
      <label for="nearlyEveryDaySleep">Nearly every day</label>
    </div>
    <div>
      <button type="submit">Next</button>
    </div>
  </form>
</div>
<script>
```

```
    document.getElementById('mentalHealthQuizPart1').addEventListener('submit', function(event) {
        event.preventDefault(); // Prevent default form submission
        const age = document.getElementById('age').value;
        const gender = document.getElementById('gender').value;
        const depressionFrequency = document.querySelector('input[name="depressionFrequency"]:checked').value;
        const selfHarmThoughts = document.querySelector('input[name="selfHarmThoughts"]:checked').value;
        const anxietyFrequency = document.querySelector('input[name="anxietyFrequency"]:checked').value;
        const worthlessnessFrequency = document.querySelector('input[name="worthlessnessFrequency"]:checked').value;
        const sleepFrequency = document.querySelector('input[name="sleepFrequency"]:checked').value;
        localStorage.setItem('age', age);
        localStorage.setItem('gender', gender);
        localStorage.setItem('depressionFrequency', depressionFrequency);
        localStorage.setItem('selfHarmThoughts', selfHarmThoughts);
        localStorage.setItem('anxietyFrequency', anxietyFrequency);
        localStorage.setItem('worthlessnessFrequency', worthlessnessFrequency);
        localStorage.setItem('sleepFrequency', sleepFrequency);
        window.location.href = 'out.html';
    });
</script>
</body>
</html>
```

#store_results.php

```
<?php
session_start();
$servername = "localhost";
```

```
$username = "root";
$password = " "
$dbname = " ";
$conn = new mysqli($servername, $username, $password, $dbname);
if ($conn->connect_error) {
    die("Connection failed: " . $conn->connect_error);
}
$depressionFrequency = $_POST['depressionFrequency'];
$selfHarmThoughts = $_POST['selfHarmThoughts'];
$anxietyFrequency = $_POST['anxietyFrequency'];
$worthlessnessFrequency = $_POST['worthlessnessFrequency'];
$sleepFrequency = $_POST['sleepFrequency'];
$totalScore = $_POST['totalScore'];
$riskLevel = $_POST['riskLevel'];

$stmt = $conn->prepare("INSERT INTO assessment_results (depression_frequency,
self_harm_thoughts, anxiety_frequency, worthlessness_frequency, sleep_frequency,
total_score, risk_level) VALUES (?, ?, ?, ?, ?, ?, ?)");
$stmt->bind_param("iiiiiis", $depressionFrequency, $selfHarmThoughts,
$anxietyFrequency, $worthlessnessFrequency, $sleepFrequency, $totalScore,
$riskLevel);
if ($stmt->execute()) {
    echo "Record inserted successfully";
} else {
    echo "Error: " . $stmt->error;
}
$stmt->close();
$conn->close();
?>
```

#out.html

```
<!DOCTYPE html>
<html lang="en">
<head>
   <meta charset="UTF-8">
   <meta name="viewport" content="width=device-width, initial-scale=1.0">
   <title>Mental Health and Suicide Prediction Results</title>
   <style>
      body {
         font-family: 'Arial', sans-serif;
         background-color: #f0f4f8;
         display: flex;
         justify-content: center;
         align-items: center;
         min-height: 100vh;
         margin: 0;
         flex-direction: column;
      }
      .container {
         background-color: #ffffff;
         padding: 30px;
         border-radius: 10px;
         box-shadow: 0 4px 15px rgba(0, 0, 0, 0.1);
         max-width: 600px;
         width: 100%;
         text-align: center;
         margin-bottom: 20px;
      }
      h1 {
```

```
    font-size: 24px;
    color: #333;
    margin-bottom: 20px;
}
p {
    font-size: 16px;
    color: #555;
    line-height: 1.6;
}
.result-box {
    padding: 20px;
    margin-bottom: 20px;
    border-radius: 10px;
    font-weight: bold;
}

.high-risk {
    background-color: #f8d7da;
    color: #721c24;
    border-left: 5px solid #f5c6cb;
}
.moderate-risk {
    background-color: #fff3cd;
    color: #856404;
    border-left: 5px solid #ffeeba;
}
.low-risk {
    background-color: #d4edda;
    color: #155724;
    border-left: 5px solid #c3e6cb;
}
.quote {
    font-style: italic;
    font-size: 18px;
    color: #333;
}
.contact-info {
    font-size: 16px;
    background-color: #e2e3e5;
    padding: 10px;
    border-radius: 8px;
    margin-top: 15px;
}


.chat-container {
    background-color: #ffffff;
    border-radius: 10px;
    box-shadow: 0 4px 15px rgba(0, 0, 0, 0.1);
    padding: 20px;
    width: 100%;
    max-width: 600px;
    margin-top: 20px;
    position: relative;
}
.chat-box {
    max-height: 200px;
    overflow-y: auto;
```

```
   padding-bottom: 20px;
   margin-bottom: 10px;
}
.chat-message {
   padding: 10px;
   border-radius: 10px;
   margin-bottom: 10px;
   width: fit-content;
   max-width: 70%;
}
.bot-message {
   background-color: #e2e3e5;
   color: #333;
   margin-left: 0;
}

.user-message {
   background-color: #4caf50;
   color: white;
   margin-left: auto;
}
.chat-input {
   display: flex;
   align-items: center;
}
.chat-input button {
   background-color: #4caf50;
   border: none;
   color: white;
```

```
            padding: 10px 15px;
            border-radius: 5px;
            margin-left: 10px;
            cursor: pointer;
        }
        .chat-input input {
            width: 100%;
            padding: 10px;
            border-radius: 5px;
            border: 1px solid #ccc;
        }
    </style>
</head>
<body>
<div class="container">
    <h1>Your Mental Health Assessment</h1>
    <div id="result"></div>
</div>
<div class="chat-container">
    <div id="chatBox" class="chat-box"></div>
    <div class="chat-input">
        <input type="text" id="userInput" placeholder="Type your response here..."
disabled>
        <button id="sendButton" disabled>Send</button>
    </div>
</div>
<script>
    const depressionFrequency = parseInt(localStorage.getItem
('depressionFrequency'));
```

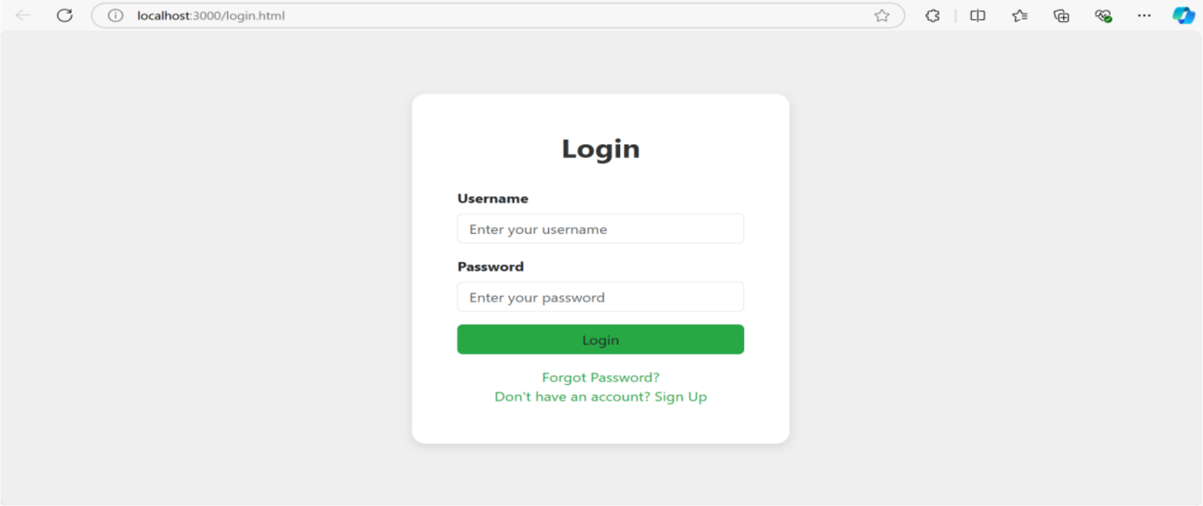
```
    const selfHarmThoughts = parseInt(localStorage.getItem('selfHarmThoughts'));
    const anxietyFrequency = parseInt(localStorage.getItem('anxietyFrequency'));
    const worthlessnessFrequency = parseInt(localStorage.getItem
('worthlessnessFrequency'));
    const sleepFrequency = parseInt(localStorage.getItem('sleepFrequency'));
    const resultDiv = document.getElementById('result');
    const chatBox = document.getElementById('chatBox');
    const userInput = document.getElementById('userInput');
    const sendButton = document.getElementById('sendButton');
    const totalScore = depressionFrequency + selfHarmThoughts + anxietyFrequency +
worthlessnessFrequency + sleepFrequency;
    function addChatMessage(message, sender) {
        const chatMessage = document.createElement('div');
        chatMessage.classList.add('chat-message', sender === 'bot' ? 'bot-message' :
'user-message');
        chatMessage.textContent = message;
        chatBox.appendChild(chatMessage);
        chatBox.scrollTop = chatBox.scrollHeight;
    }
    function startChat() {
        addChatMessage("Hi, I'm here to support you. Do you need any further
assistance or advice?", 'bot');
        userInput.disabled = false;
        sendButton.disabled = false;
    }
    sendButton.addEventListener('click', function() {
        const userText = userInput.value.trim();
        if (userText === "") return;
        addChatMessage(userText, 'user');
        if (userText.toLowerCase() === 'yes') {
            addChatMessage("I'm glad you reached out. You can contact a professional at 1-800-123-4567 or talk to a trusted friend.", 'bot');
        } else if (userText.toLowerCase() === 'no') {
            addChatMessage("That's okay! Remember, we're always here if you need help. Take care of yourself.", 'bot');
        } else {
            addChatMessage("I didn't quite get that. Please respond with 'Yes' or 'No'.", 'bot');
        }
        userInput.value = " ";
    });
    let riskLevel;
    if (totalScore >= 10) {
        riskLevel = 'High Risk';
        resultDiv.innerHTML = `
            <div class="result-box high-risk">
                <p><strong>It looks like you're going through a very tough time. </strong></p>
                <p>We strongly encourage you to reach out to someone you trust or contact a mental health professional.</p>
            </div>
            <div class="contact-info">
                <p>Here is a counselor's contact number: <strong>1-800-123-4567 </strong>.</p>
            </div>
         ;
    } else if (totalScore >= 5) {
        riskLevel = 'Moderate Risk';
        resultDiv.innerHTML = `
```

```
      <div class="result-box moderate-risk">
        <p><strong>You're going through a difficult period, but things can get better. </strong></p>
      </div>
      <p class="quote">"The greatest glory in living lies not in never falling, but in rising every time we fall." - Nelson Mandela</p>
    ;
  }
else {
    riskLevel = 'Low Risk';
    resultDiv.innerHTML =
      <div class="result-box low-risk">
        <p><strong>It seems like you're managing well, but it's okay to seek help whenever you need it.</strong></p>
      </div>
      <p class="quote">"Believe in yourself and all that you are. Know that there is something inside you that is greater than any obstacle." - Christian D. Larson</p>
    ;
  }
  fetch('store_results.php', {
    method: 'POST',
    headers: {
      'Content-Type': 'application/x-www-form-urlencoded',
    },
    body: new URLSearchParams({
      'depressionFrequency': depressionFrequency,
      'selfHarmThoughts': selfHarmThoughts,
      'anxietyFrequency': anxietyFrequency,
      'worthlessnessFrequency': worthlessnessFrequency,
            'sleepFrequency': sleepFrequency,
            'totalScore': totalScore,
            'riskLevel': riskLevel
        })
    })
    .then(response => response.text())
    .then(data => console.log(data))
    .catch(error => console.error('Error:', error));
    setTimeout(startChat, 1000);
</script>
</body>
</html>
```

CHAPTER 7

SCREENSHOTS

7.1 Login page



localhost:3000/login.html

Login

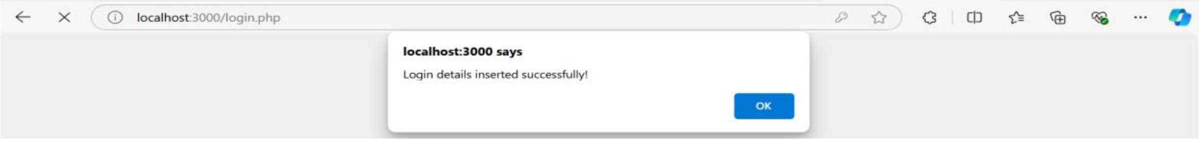
Username

Enter your username

Password

Enter your password

7.2 Login successful

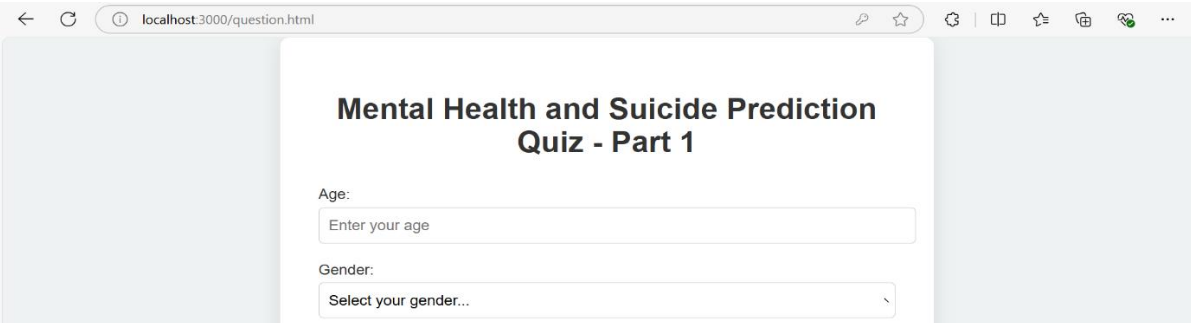


localhost:3000/login.php

localhost:3000 says

Login details inserted successfully!

7.3 Web Page



localhost:3000/question.html

Mental Health and Suicide Prediction Quiz - Part 1

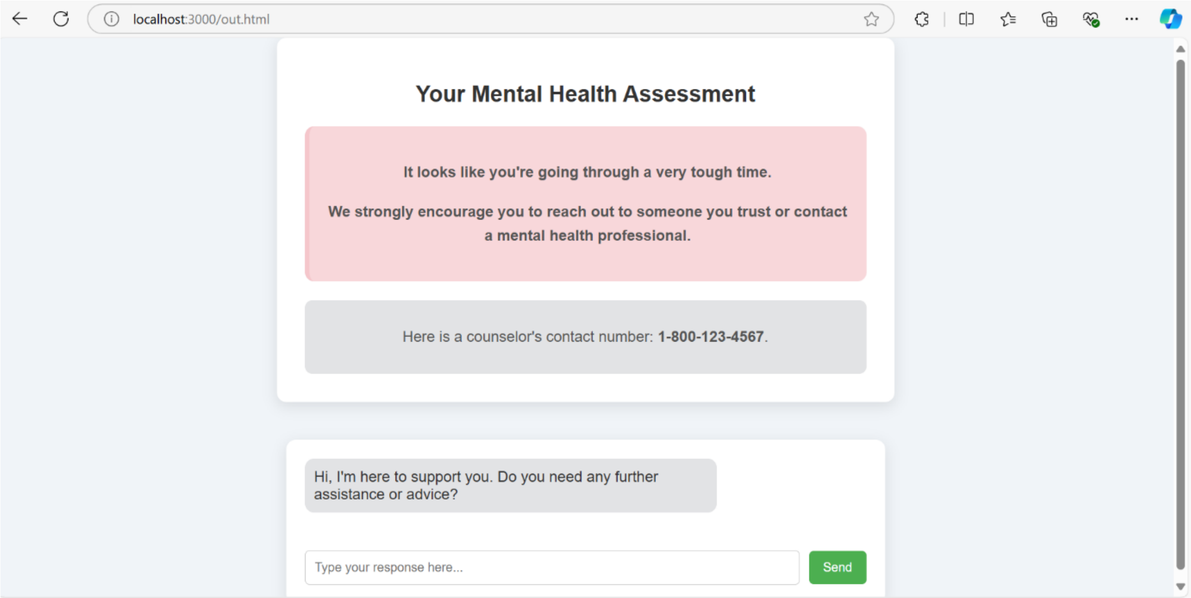
Age:

Enter your age

Gender:

Select your gender...

7.4 RESULT



Your Mental Health Assessment

It looks like you're going through a very tough time.

We strongly encourage you to reach out to someone you trust or contact a mental health professional.

Here is a counselor's contact number: **1-800-123-4567**.

Hi, I'm here to support you. Do you need any further assistance or advice?

Type your response here...

CHAPTER 8
CONCLUSION

The development of a system for suicidal detection and prediction is an important step toward leveraging technology in mental health care and suicide prevention. By employing advanced machine learning and natural language processing techniques, this project aims to identify individuals at risk of suicidal ideation based on their online expressions and clinical data.

Through the integration of multiple modules—ranging from data collection and preprocessing to model development and evaluation—the system provides a robust framework for detecting early warning signs of suicide. The use of diverse machine learning models and feature extraction techniques ensures that the system can handle complex, unstructured data, producing reliable and actionable predictions. Additionally, the system design prioritizes user privacy and ethical considerations, ensuring that the sensitive nature of mental health data is protected throughout the process.

While the system shows promise in its ability to detect suicidal tendencies, it also acknowledges the need for human oversight, emphasizing that AI tools should complement—not replace—mental health professionals. The feedback loop incorporated into the system allows for continuous improvement, as user input and new data will further refine the model's accuracy over time.

In conclusion, this project provides a technological solution to one of the most pressing issues in public health—suicide prevention. The proposed system not only has the potential to facilitate timely interventions but also highlights the role of artificial intelligence in augmenting mental health care services. Future work will focus on refining model performance, incorporating multimodal data sources, and ensuring the ethical deployment of this technology in real-world settings. With continued research and collaboration, such tools can significantly contribute to saving lives and improving mental health outcomes.

CHAPTER 9

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