Smart Bridge :Panic Disorder Detection

Milestone 1: Project Initialization and Planning Phase

The "Project Initialization and Planning Phase" marks the project's outset, defining goals, scope, and stakeholders. This crucial phase establishes project parameters, identifies key team members, allocates resources, and outlines a realistic timeline. It also involves risk assessment and mitigation planning. Successful initiation sets the foundation for a well-organized and efficiently executed machine learning project, ensuring clarity, alignment, and proactive measures for potential challenges.

Activity 1: Define Problem Statement

Develop a machine learning model to accurately detect panic disorder based on physiological and behavioral data, aiming to improve early diagnosis and intervention. Panic disorder is a type of anxiety disorder characterized by recurrent and unexpected panic attacks. These attacks are sudden episodes of intense fear or discomfort that reach a peak within minutes, often accompanied by physical symptoms such as rapid heart rate, sweating, trembling, shortness of breath, and a feeling of impending doom or loss of control.

Problem Statement Report: **Click Here**

Activity 2: Project Proposal (Proposed Solution)

When proposing a project for panic disorder detection, it's essential to structure your proposal effectively to clearly outline the problem, objectives, methodology, expected outcomes, and practical considerations. Here's a detailed guide on how to craft a project proposal for panic disorder detection

Project Proposal Report: **Click Here**

Activity 3: Initial Project Planning

- Specify the focus of your project, such as whether you will focus on physiological signals, behavioral patterns, or both.
- Determine the target population (e.g., adults, adolescents) and settings (e.g., clinical, home-based monitoring).

Project Planning Report: **Click Here**

Milestone 2: Data Collection and Preprocessing Phase

- **Heart Rate Variability (HRV):** Collect heart rate data using wearable devices like heart rate monitors or smartwatches. HRV metrics such as time-domain (e.g., RMSSD, SDNN) and frequency-domain (e.g., LF/HF ratio) are commonly used indicators of autonomic nervous system activity and can reflect changes during panic attacks.

Activity 1: Data Collection Plan, Raw Data Sources Identified, Data Quality Report

This report assesses the quality of data collected for developing a panic disorder detection system. Physiological data, including heart rate variability and skin conductance, were gathered using wearable sensors under controlled conditions, ensuring consistent sampling rates and duration. Behavioral data, such as activity levels and speech patterns, were recorded using accelerometers and audio recordings to capture changes during panic episodes. Self-reported symptoms provided subjective insights into individuals' experiences during panic attacks

Data Collection Report: Click Here

Activity 2: Data Quality Report

This report evaluates the quality of data collected for the development of a panic disorder detection system, aiming to ensure its reliability and suitability for accurate diagnosis and intervention. The dataset includes physiological signals obtained through wearable devices, capturing metrics such as heart rate variability (HRV) and skin conductance levels during panic episodes. Behavioral data encompasses activity levels monitored via accelerometers and speech patterns analyzed from recorded audio samples

Data Quality Report: Click Here

Activity 3: Data Exploration and Preprocessing

Data exploration and preprocessing are essential stages in developing a robust panic disorder detection system. This process involves understanding the characteristics of the collected data, identifying patterns, and preparing the data for analysis to ensure accuracy and reliability in detecting panic disorder episodes.

Data Exploration and Preprocessing Report: Click Here

Milestone 3: Model Development Phase

The Model Development Phase entails crafting a predictive model for loan approval. It encompasses strategic feature selection, evaluating and selecting models (Random Forest, Decision Tree, Logistic Regression, K-Nearest Neighbors), initiating training with code, and rigorously validating and assessing model performance for informed decision-making in the lending process.

Activity 1: Feature Selection Report

The Feature Selection Report outlines the rationale behind choosing specific features (e.g., accelerations, prolongued_decelerations etc..) for the panic disorder detection . It evaluates relevance, importance, and impact on predictive accuracy, ensuring the inclusion of key factors influencing the model's ability to predict the panic risks and health condition.

Feature Selection Report: Click Here

Activity 2: Model Selection Report

The Model Selection Report details the rationale behind choosing Random Forest, Decision Tree, Logistic Regression, K-Nearest Neighbors models for fetal health prediction. It considers each model's strengths in handling complex relationships, interpretability, adaptability, and overall predictive performance, ensuring an informed choice aligned with project objectives.

Model Selection Report: Click Here

Activity 3: Initial Model Training Code, Model Validation and Evaluation Report

The Initial Model Training Code employs selected algorithms on the patient health dataset, setting the foundation for predictive modeling. The subsequent Model Validation and Evaluation Report rigorously assesses model performance, employing metrics like accuracy and confusion metrics to ensure reliability and effectiveness in predicting patient health.

Model Development Phase Template: Click Here

Milestone 4: Model Optimization and Tuning Phase

The Model Optimization and Tuning Phase involves refining machine learning models for peak performance. It includes optimized model code, fine-tuning hyperparameters, comparing performance metrics, and justifying the final model selection for enhanced predictive accuracy and efficiency.

Activity 1: Hyperparameter Tuning Documentation

The Logistic Regression model was selected for its superior performance, exhibiting high accuracy during hyperparameter tuning. Its ability to handle complex relationships, minimize overfitting, and optimize predictive accuracy aligns with project objectives, justifying its selection as the final model.

Activity 2: Performance Metrics Comparison Report

The Performance Metrics Comparison Report contrasts the baseline and optimized metrics for various models, specifically highlighting the enhanced performance of the Logistic Regression model. This assessment provides a clear understanding of the refined predictive capabilities achieved through hyperparameter tuning.

Activity 3: Final Model Selection Justification

The Final Model Selection Justification articulates the rationale for choosing Logistic Regression as the ultimate model. Its exceptional accuracy, ability to handle complexity, and successful hyperparameter tuning align with project objectives, ensuring optimal patient health predictions.

Model Optimization and Tuning Phase Report: Click Here

Milestone 5: Project Files Submission and Documentation

For project file submission in Git hub, Kindly click the link and refer to the flow. **Click Here**

For the documentation, Kindly refer to the link. **Click Here**

Milestone 6: Project Demonstration

In the upcoming module called Project Demonstration, individuals will be required to record a video by sharing their screens. They will need to explain their project and demonstrate its execution during the presentation.