

AIR QUALITY INDEX ANALYZER

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

The air quality index (AQI) is an index for reporting air quality on a daily basis. It is a measure of how air pollution affects one's health within a short time period. The purpose of the AQI is to help people know how the local air quality impacts their health.

The higher the AQI value, the greater the level of air pollution and the greater the health concerns. The concept of AQI has been widely used in many developed countries over the last three decades. AQI quickly disseminates air quality information in real time. Awareness of daily levels of air pollution is important, especially for those suffering from illnesses caused by exposure to air pollution

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Activity 2: Project Proposal (Proposed Solution)

This project aims to develop a machine learning model to predict the Air Quality Index (AQI) based on various environmental and pollutant factors. The model will be integrated into a web-based application to provide real-time AQI predictions, helping individuals and authorities make informed decisions to protect public health and manage environmental policies effectively

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Activity 3: Initial Project Planning

This involves outlining key objectives, defining the scope, and identifying stakeholders for the Air Quality Index (AQI) Analyzer project. It encompasses setting timelines, allocating resources, and determining the overall project strategy. During this phase, the team establishes a clear understanding of the dataset, formulates goals for analysis, and plans the workflow for data processing. Effective initial planning lays the foundation for a systematic and well-executed project, ensuring successful outcomes and timely delivery of the final product

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Milestone 2: Data Collection and Preprocessing Phase

The Data Collection and Preprocessing Phase involves executing a plan to gather relevant Falcon 9 launch data from Kaggle, ensuring data quality through verification and addressing missing values. Preprocessing tasks include cleaning, encoding, and organizing the dataset for subsequent exploratory analysis and machine learning model development.

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

The dataset for the "Air Quality Index (AQI) Analyzer" is sourced from reputable environmental agencies and organizations. It includes details on pollutant levels, meteorological conditions and historical AQI records. Data quality is ensured through thorough verification, addressing missing values, and adhering to ethical guidelines, establishing a reliable foundation for accurate predictive modeling. This meticulous approach is essential for developing a robust machine learning model that can effectively analyze and predict air quality.

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Activity 2: Data Quality Report

Ensuring the integrity of the dataset by handling missing values, removing duplicates, and validating the accuracy of recorded information. This step is critical to ensure that the machine learning models built on this data are reliable and robust.

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Activity 3: Data Exploration and Preprocessing

Analyzing the AQI dataset to understand patterns, distributions, and outliers. Preprocessing includes handling missing values, scaling, and encoding categorical variables. These crucial steps enhance data quality, ensuring the reliability and effectiveness of subsequent analyses in predicting landing success.

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Milestone 3: Model Development Phase

The Model Development Phase entails crafting a predictive model for AQI landing success. It encompasses strategic feature selection, evaluating and selecting models (Decision Tree, Random Forest,Extra tree,Xgboost), initiating training with code, and rigorously validating and assessing model performance for informed decision-making.

Activity 1: Feature Selection Report

Outlining the rationale behind choosing specific features for the landing success model. It evaluates relevance, importance, and impact on predictive accuracy, ensuring the inclusion of key factors influencing the model's ability to predict successful landings.

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Activity 2: Model Selection Report

Detailing the rationale behind choosing Decision Tree,Random Forest,XGBOOST,Extra Tree models for landing success 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.

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

Employing selected algorithms on the AQI landing dataset, setting the foundation for predictive modeling. The subsequent Model Validation and Evaluation Report rigorously assesses model performance, employing metrics like r2 score and mrse to ensure reliability and effectiveness in predicting landing outcomes.

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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: 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 Extra Tree model. This assessment provides a clear understanding of the refined predictive capabilities achieved through hyperparameter tuning.

Activity 2: Final Model Selection Justification

The Final Model Selection Justification articulates the rationale for choosing Extra Tree as the ultimate model. Its exceptional accuracy, ability to handle complexity, and successful align with project objectives, landing success predictions.

Air Quality Index Analyzer Problem Statement Report:**Milestone 5: Project Files Submission and Documentation**

For project file submission in Github, Kindly click the link and refer to the flow.

For the documentation, Kindly refer to the link.

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.