

SMOKE DETECTION USING IOT DATASET

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

Problem Statement: A researcher in IOT engineering wants to introduce a smoke detector which detects the presence of fire by sensing certain particles present in the atmosphere and signals the sound alarm. So this will be helpful in ensuring safety and protecting many people lives.

Smoke Detector Problem Statement Report: [Link](#)

Activity 2: Project Proposal (Proposed Solution)

The proposed project, "Smoke Detection Using IOT Dataset," aims to leverage machine learning for more accurate Smoke predictions. Using a comprehensive dataset including temperature, humidity, CNT, Raw H2 the project seeks to develop a detector model which detects the fire earlier by signaling a sound alarm.

Smoke Detector Project Proposal Report: [Link](#)

Activity 3: Initial Project Planning

The initial project planning report for the smoke detector will outline the scope, including device functionality and compliance with safety standards, define the timeline with key milestones for design, testing, and deployment, and establish a budget covering development, manufacturing, and marketing costs.

Smoke Detector Project Planning Report : [Link](#)

Milestone 2: Data Collection and Preprocessing Phase

The Data Collection and Preprocessing Phase involves executing a plan to gather relevant smoke detection application 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 "Smoke Detection Using IOT Dataset" is sourced from Kaggle. It includes elements of weather like temperature, humidity etc.. Data quality is ensured through thorough verification, addressing missing values, and maintaining adherence to ethical guidelines, establishing a reliable foundation for predictive modeling.

Smoke Detector Data Collection Report: [Link](#)

Activity 2: Data Quality Report

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Smoke Detector Data Quality Report: [Link](#)

Activity 3: Data Exploration and Preprocessing

Data Exploration involves analyzing the smoke detector 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 the loan approval project.

Smoke Detector Data Exploration and Preprocessing Report: [Link](#)

Milestone 3: Model Development Phase

The Model Development Phase entails crafting a predictive model for detection of smoke . It encompasses strategic feature selection, evaluating and selecting models (Decision Tree, KNN, Gradient Boost, Logistic Regression), initiating training with code, and rigorously validating and assessing model performance for informed decision-making in the detection process.

Activity 1: Feature Selection Report

The Feature Selection Report outlines the rationale behind choosing specific features (e.g., Temperature, Humidity etc) for the smoke detection model. It evaluates relevance, importance, and impact on predictive accuracy, ensuring the inclusion of key factors influencing the model's ability to detect smoke.

Smoke Detector Feature Selection Report: [Link](#)

Activity 2: Model Selection Report

The Model Selection Report details the rationale behind choosing Decision Tree, KNN, Gradient Boost and Logistic Regression models for smoke detection. It considers each model's strengths in

handling complex relationships, interpretability, adaptability, and overall predictive performance, ensuring an informed choice aligned with project objectives.

Smoke Detector Model Selection Report: [Link](#)

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

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

Smoke Detector Model Development Phase Template: [Link](#)

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 KNN 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 KNN 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 KNN as the ultimate model. Its exceptional accuracy, ability to handle complexity, and successful hyperparameter tuning align with project objectives, ensuring smoke detection.

Smoke Detector Model Optimization and Tuning Phase Report: [Link](#)

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.