

Predictive Maintenance Model

Team Members

Team 5

Mohamed Ahmed Rabea

Muhammad Usama Aowad

Youssef Muhammad Saad

Ahmed Abdelsalam Abdelmaqsoud

Introduction

In today's industrial landscape, minimizing downtime and ensuring the reliability of machinery are critical to maintaining operational efficiency. This project focuses on developing a Predictive Maintenance Model that anticipates machine failures before they occur, helping companies reduce costly unplanned maintenance and improve productivity.

Project Planning

WBS

Task Name	Duration (days)	Start	Finish
1. Project Initialization	2	Sep 25, 2024	Sep 26, 2024
Gather Requirements	1	Sep 25, 2024	Sep 25, 2024
Dataset Acquisition	1	Sep 26, 2024	Sep 26, 2024
2. Data Preprocessing	3	Sep 30, 2024	Oct 2, 2024
Data Exploration	2	Sep 30, 2024	Oct 1, 2024
Handle Class Imbalance	1	Oct 2, 2024	Oct 2, 2024
3. Model Development	3	Oct 7, 2024	Oct 9, 2024
Model Training	2	Oct 7, 2024	Oct 8, 2024
Model Evaluation	1	Oct 9, 2024	Oct 9, 2024
4. Deployment & Testing	2	Oct 14, 2024	Oct 15, 2024
Flask App Development	1	Oct 14, 2024	Oct 14, 2024
Model Integration & Testing	1	Oct 15, 2024	Oct 15, 2024
5. Reporting & Presentation	2	Oct 16, 2024	Oct 16, 2024
Create Project Report	1	Oct 16, 2024	Oct 16, 2024
Prepare Final Presentation	1	Oct 16, 2024	Oct 16, 2024
6. Project Closeout	1	Oct 16, 2024	Oct 16, 2024

Data Analysis

The focus is on exploring the dataset to uncover key insights, relationships, and patterns that will guide the development of the predictive model. This phase is crucial for understanding how different features relate to machine failures and identifying potential challenges in the data.

What we've done:

- Exploring data set.
- Class Imbalance analysis.
- Feature Correlations analysis.
- Feature Importance ranking.

Data Preprocessing

The primary goal is to clean, transform, and prepare the raw data for analysis and model building. This is a critical step, as the quality of the data directly impacts the accuracy and performance of the machine learning model.

What we've done:

- Resampling data to handle Class Imbalance.
- Selecting important features according to the Feature Correlations analysis.
- Splitting the data set into training and testing sets.

Model Training & Evaluation

The goal is to build and train a machine learning model that could accurately predict machine failures based on the preprocessed and analyzed data. This phase involved selecting appropriate algorithms, training the models, and fine-tuning them to maximize their performance.

What we've done:

- Normalizing the data using MinMaxScaler.
- Model selection (Logistic regression, Decision tree, Random forest, Gradient boosting, and XGBoost).
- Training the models.
- Evaluating Metrics for each model.
- Merge the five models using Voting Classifier.
- Evaluating Metrics for the merged model.

Deployment

The primary goal is to integrate the trained model into a real-world environment where it could make predictions on live data and provide actionable insights to users. This phase involved the design and implementation of a user-friendly system for easy access, interaction, and monitoring of predictions.

What we've done:

- Designing and building a web page to deploy the model on it.
- Deploy the model using Flask.

ANY QUESTIONS?

THANK YOU