

**EDI MID Semester assessment SEM II 2023-24**

# **Predictive Maintenance System for Vehicles**

**Division: CS-SY-D**

**Batch: 2**

**Group: 1**

**Date: 05-03-2024**

## **Presented By :-**

**31 Sagar Shahari**

**43 Soham Kasurde**

**44 Soham Nimale**

**47 Soham Surdas**

**52 Shubham Tayde**

## **Guided By :-**

**Prof. Amruta Amune**



**Department of Multidisciplinary Engineering  
Vishwakarma Institute of Technology, Pune  
SEM II A.Y.(2023-2024)**

# TABLE OF CONTENTS

## **112 Problem Statement**

- **Introduction**
- **Literature Review**
- **Proposed Solution**
- **Methodology**
- **Hardware and Software Requirements**
- **System Architecture**
- **AI model Development**
- **Results**
- **Novelty & Highlights**
- **Current Progress**
- **Upcoming tasks**
- **Conclusion**

# PROBLEM STATEMENT

**The use of Traditional Maintenance Systems leads to an increase in downtime and a decrease in the operational efficacy of the transportation sector.**

**A need is generated to have the ability of early detection of the need of maintenance.**



# INTRODUCTION

**Today, the constant evolution of vehicles is not just about speed and style; it's about intelligence.**

- One of the most exciting frontiers here is predictive maintenance for vehicle engine health. In this data-driven era, predictive maintenance emerges as the most optimal solution.
- By analyzing sensor data , we anticipate engine issues before they escalate. Due to this, we can achieve fewer breakdowns, optimized maintenance schedules, and cost savings.



# LITERATURE REVIEW

There are four categories of papers we studied



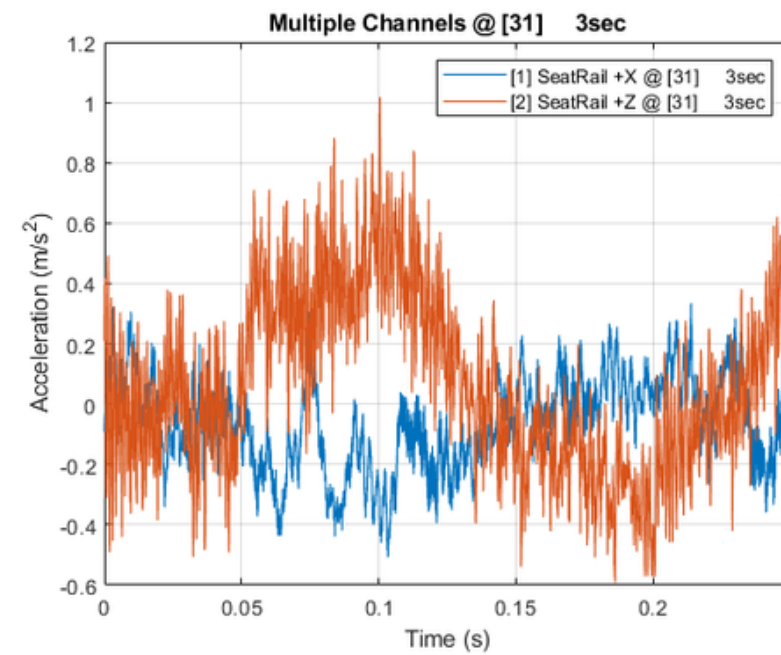
1. Vibration  
analysis

2. Fuel  
Experiments

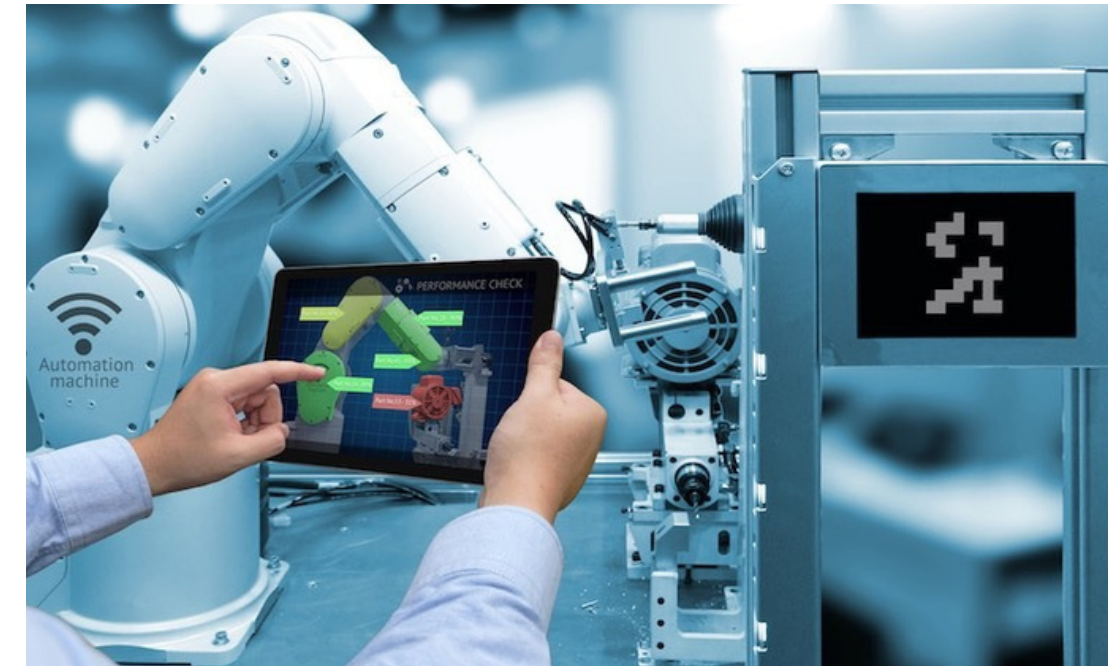
3. Predictive  
Maintenance

4. Informative  
Papers

# 1. Vibration analysis



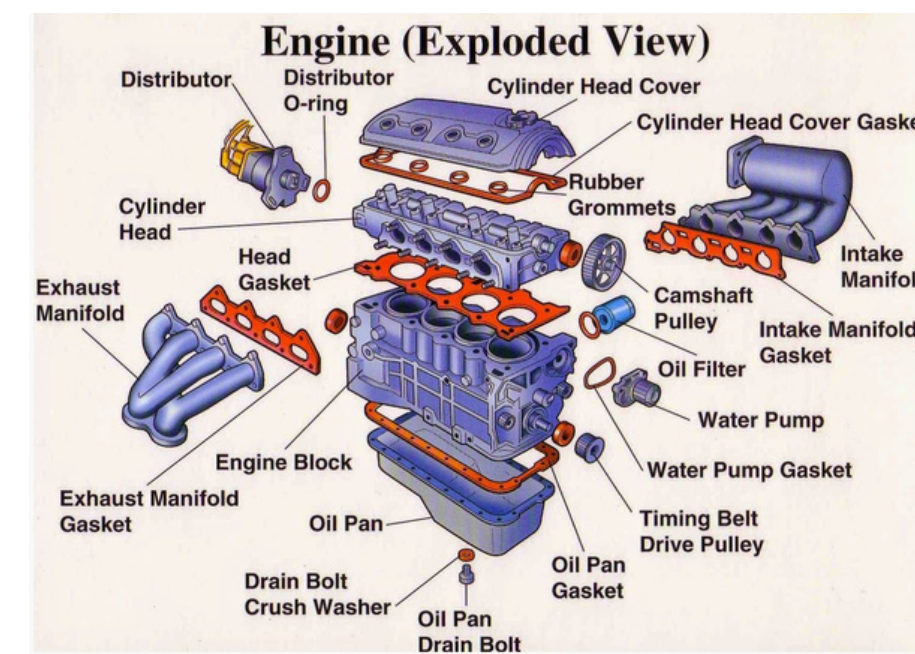
# 3. Predictive Maintenance



# 2. Fuel Experiments



# 4. Informative Papers





# OUR SOLUTION OBJECTIVES

## PREDICTIVE MAINTENANCE

**“ Developing an algorithm for early diagnosis of engine failures in vehicles based on engine-related parameters, aiming to reduce unplanned downtime and maintenance costs.”**



# METHODOLOGY

Continuous Monitoring replaced with Periodic Monitoring

Very basic, effective, and less time-consuming tests performed

Data collected from the tests is given to our AI model

AI model trained on Engine Health dataset with exceptional accuracy

Model predicts if the engine is in a good or poor health condition

We also provide dashboard for overtime vehicle data analysis for petrol-pumps to gain valuable data and insights.



# Hardware Requirements

## Sensors:

Temperature sensors :- DS18B20



Pressure sensors :- Pressure Gauges

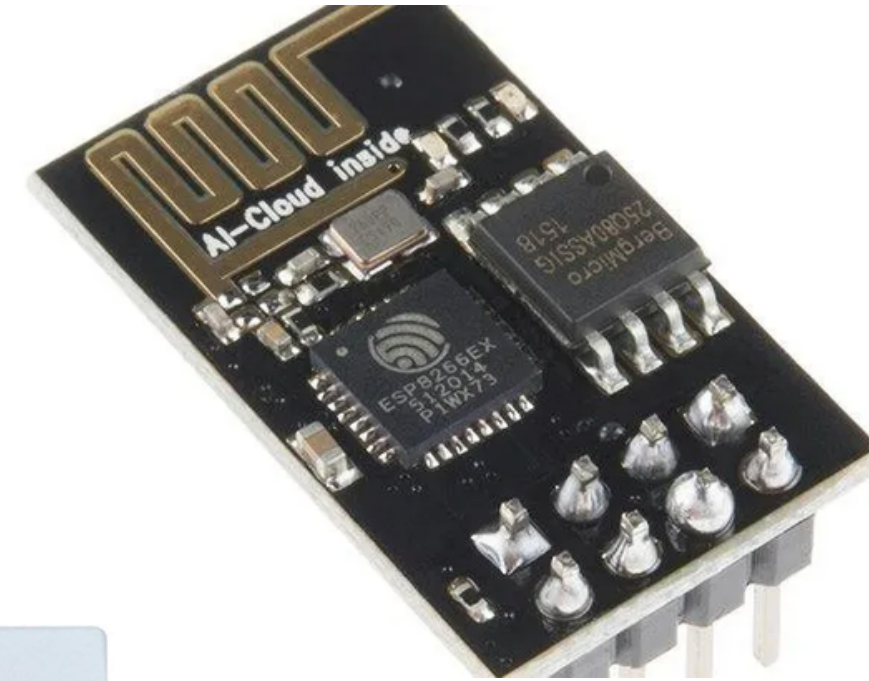


RPM sensors:- Tachometer



# Hardware Requirements

**Wireless Connectivity:** Incorporate wireless connectivity (e.g., Wi-Fi, Bluetooth, cellular) by using Esp32 WIFI Module.



**Power Source**



# Software Requirements



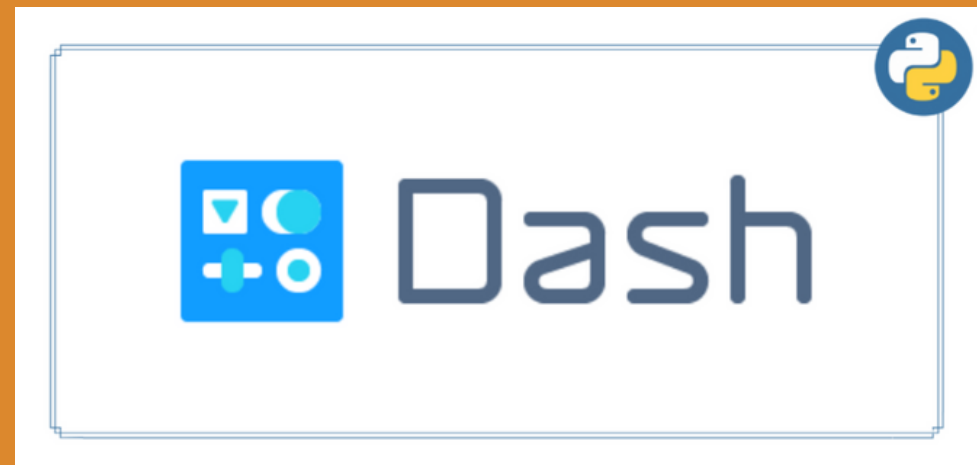
Google Collab



Matplotlib



Pandas



Scikit Learn



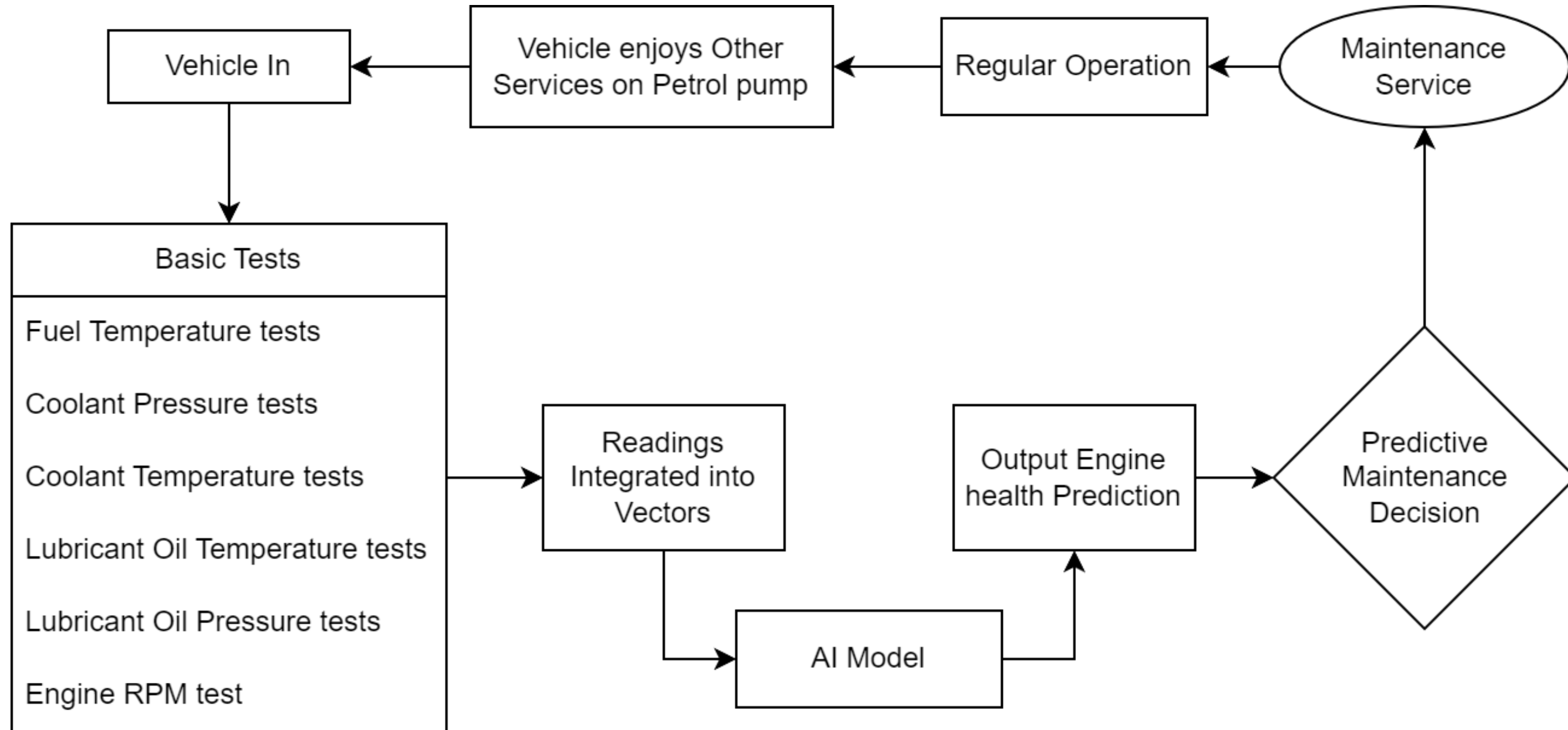
Tensorflow



Keras



# SYSTEM ARCHITECTURE



LOCALY DEPLOYED OFFLINE MODEL : DATA PRIVACY

OR

CLOUD CONNECTED CENTRALIZED MODEL: MODEL ACCURACY

# AI MODEL DEVELOPMENT

Dataset Acquisition

Exploratory Data Analysis

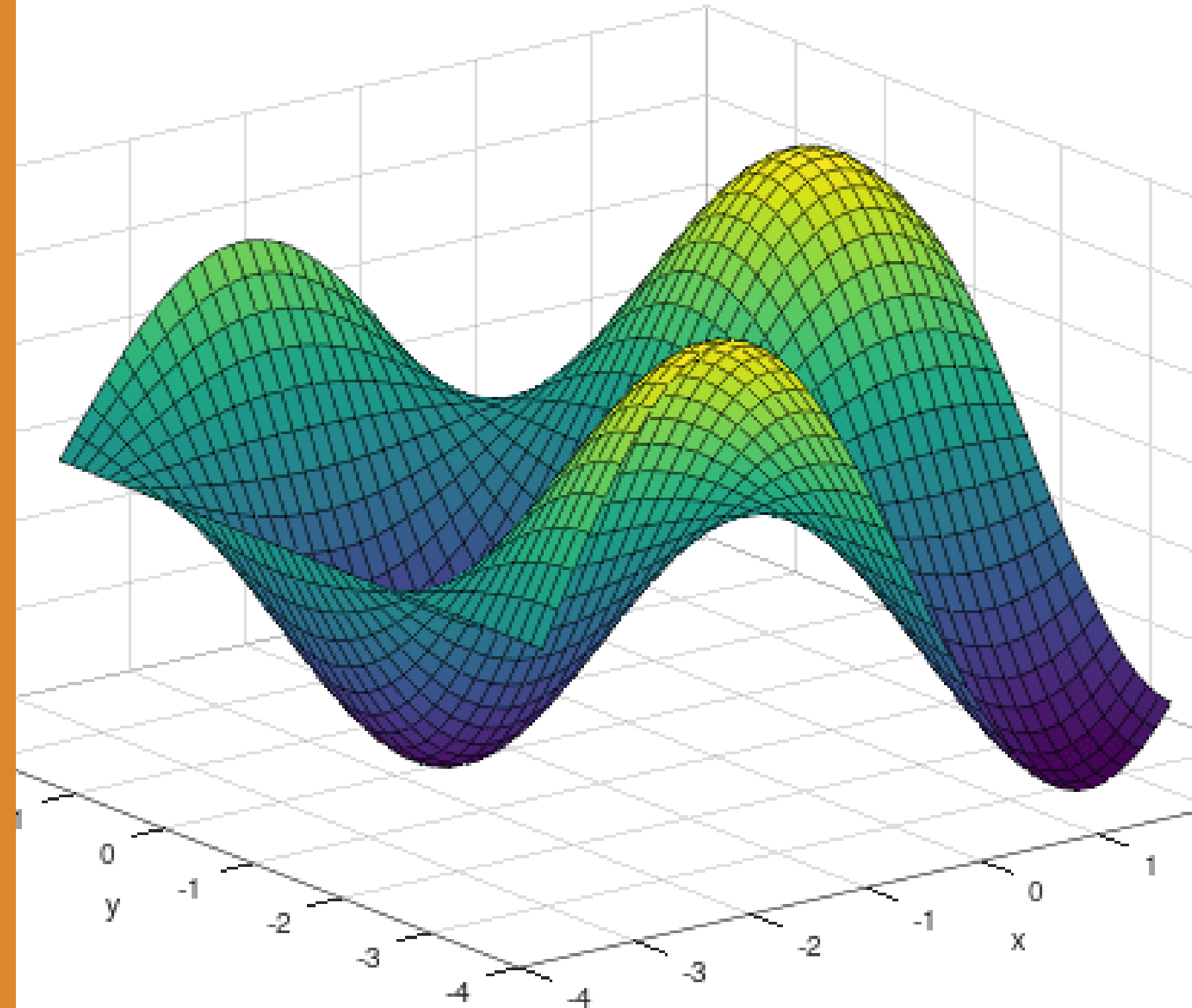
Handling Missing Values

Handling Outliers

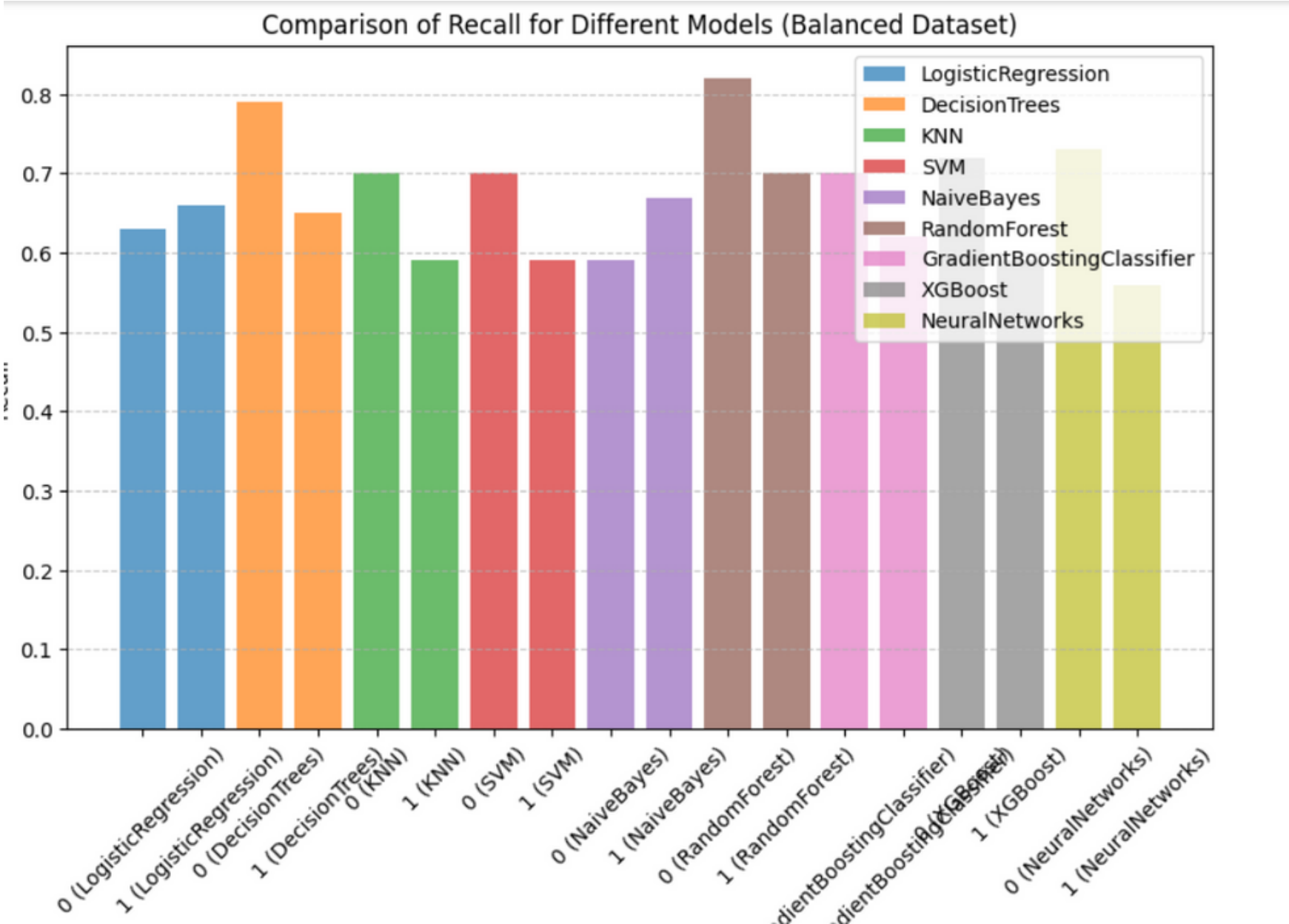
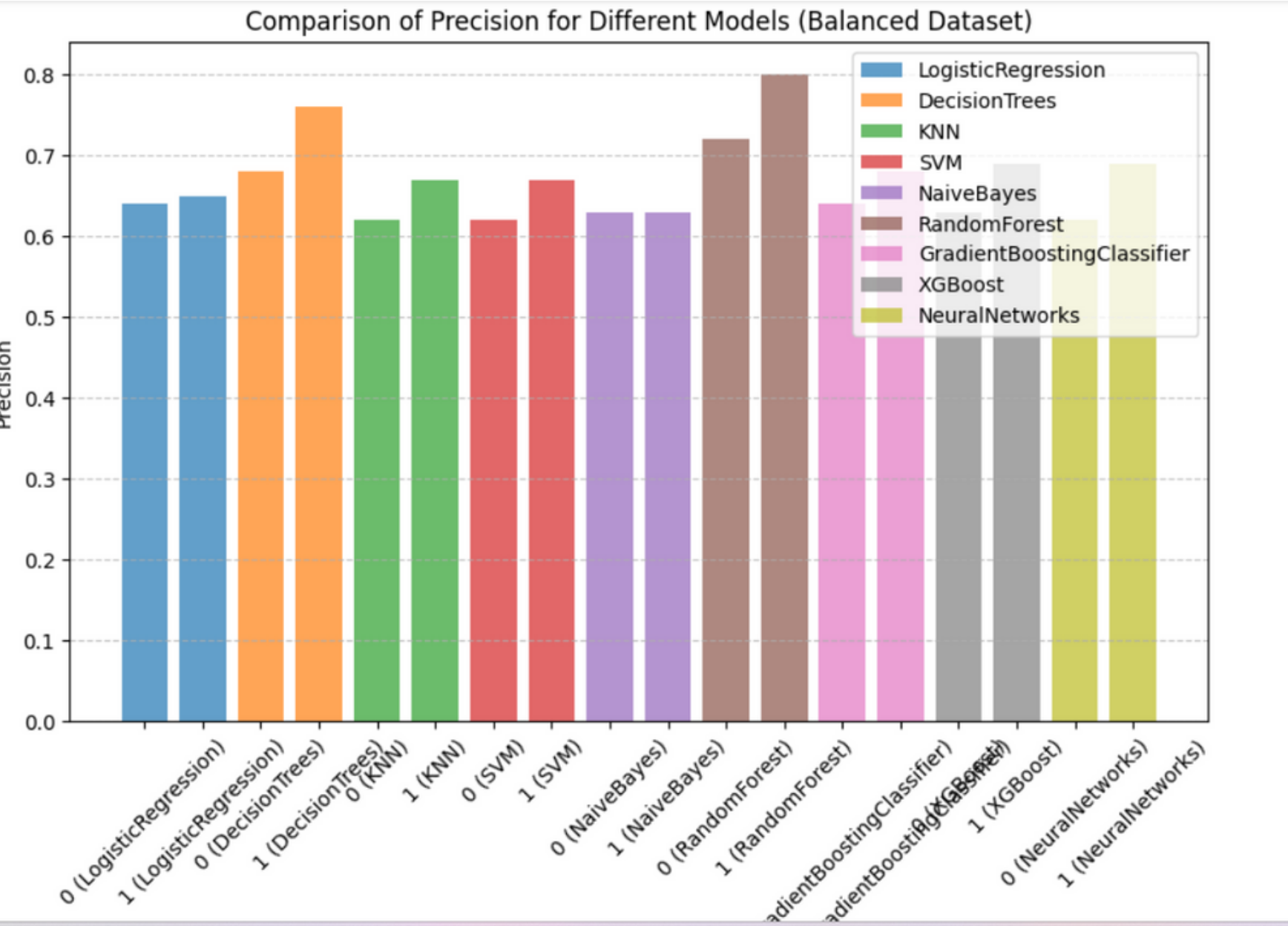
Standardization and Normalization

Model Training

Testing and Validation

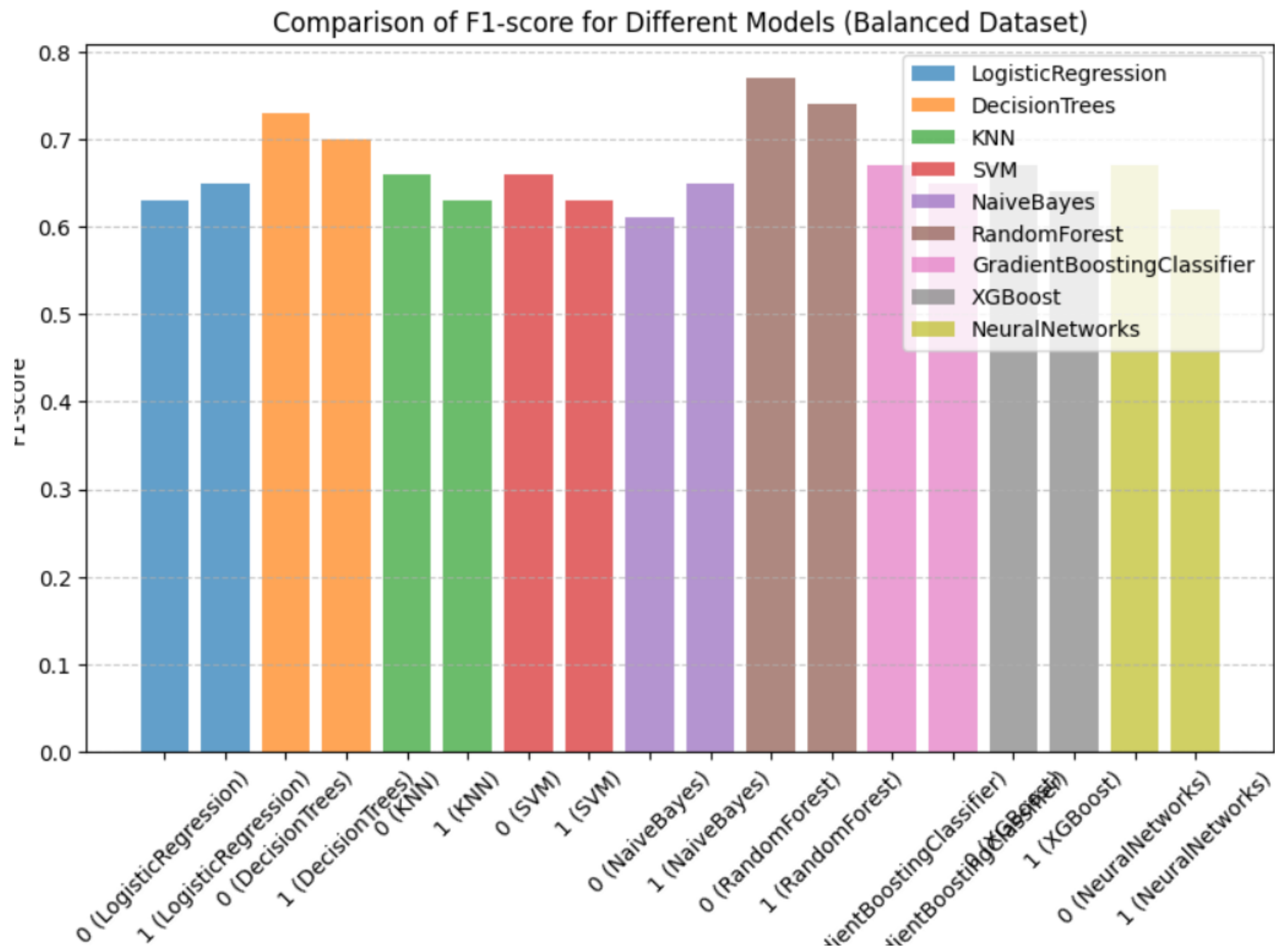


# RESULTS

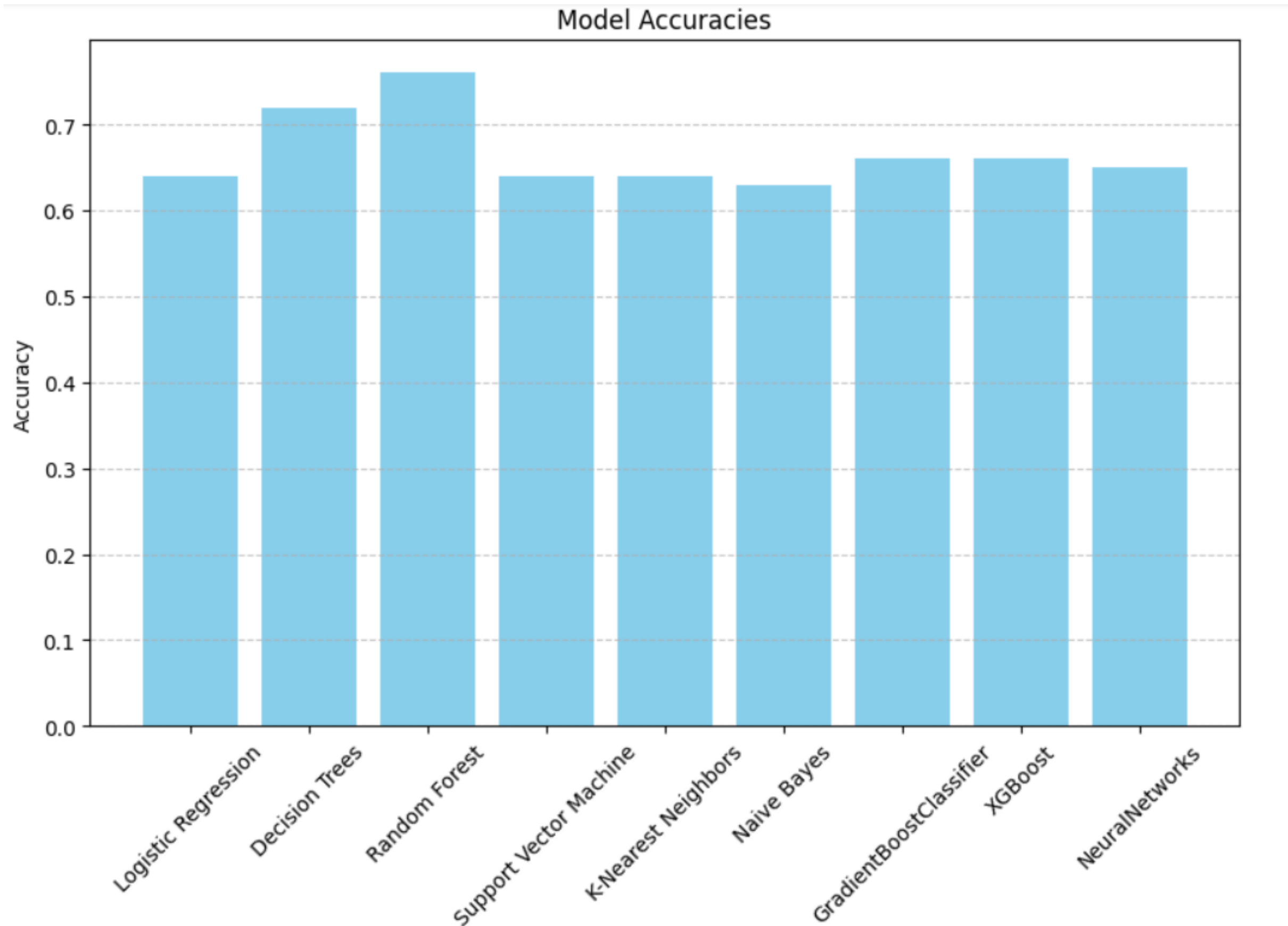




# RESULTS



# RESULTS



# NOVELTY/HIGHLIGHTS

HIGHEST ACCURACY ON THAT DATASET

NOVEL CONCEPT OF PERIODIC MAINTENANCE  
PREDICTION OVER TRADITIONAL TREND OF  
CONTINUOUS MAINTENANCE PREDICTION

EFFICIENT AND PRAGMATIC





# Current Progress

**Problem Statement Identification**

**Thorough Literature Survey**

**Survey Paper on Problem Statement**

**System Diagram and Methodology Finalization**

**Dataset Identification + analysis (dashboard)**

**Dataset processing (missing values/outliers/normalization)**

**AI Model training and comparative analysis**



# WHAT'S NEXT?

IMPLEMENTATION OF APPLICATION

DEPLOYMENT OF AI MODEL ON APPLICATION

HARDWARE PROTOTYPE CREATION

SOFTWARE AND HARDWARE INTEGRATION





# CONCLUSION



We were able to develop a superior AI model on the dataset and thus, able to solve the problem of early vehicle engine fault detection. Thus, we now focus on the development of a prototype and implementation.





**THANK YOU**