FUEL CONSUMPTION ANALYZER USING MACHINE LEARNING

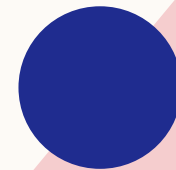Member 1 Name: Jami Abdullah

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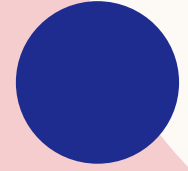Name of Supervisor: Md. Monir Ahammod Bin Atique

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INTRODUCTION AND BACKGROUND

- Fuel costs are high.

- Manual calculation is hard.

- Existing apps not always accurate.

- Real-time analysis is limited.

- Smart fuel-saving suggestions missing.

- Predictive fuel-saving suggestions are rare.

PROBLEM STATEMENT

- Nowadays , people do not understand exactly how much fuel their car is consuming.

- The more fuel you use, the more your wallet suffers.

- Car owners do not know which car consumes less fuel.

- So we need a smart Fuel Analyzer.

- That will tell you how much fuel a car consumes easily.

MOTIVATION

- Cars are increasing & oil price is very high.

- More fuel means more money spent.

- Pollution is increasing.

- Smart technology is available now.

- Smart Fuel Analyzer can solve these problems.

LITERATURE REVIEW

▪ Many researchers have used machine learning and deep learning to predict fuel consumption.

▪ Rahman et al. used machine learning models to predict vehicle fuel usage.

▪ Kumar et al. used the Auto MPG dataset to predict fuel efficiency.

▪ Ahmed et al. showed that Random Forest gives better prediction results.

▪ Hasan et al. used neural networks to predict fuel consumption.

REFERENCE/PAPER REVIEWED

| Paper Name	Paper Author and Year	Outcome
Vehicle Fuel Consumption Prediction Using Machine Learning Models	Rahman et al. (2022)	In this paper, vehicle fuel usage has been predicted using various Machine Learning models.
Fuel Efficiency Prediction Using Auto MPG Dataset and Machine Learning Techniques	Kumar et al. (2021)	Here, fuel efficiency predictions are made using the popular Auto MPG dataset.
Performance Analysis of Machine Learning Algorithms for Fuel Consumption Prediction	Ahmed et al. (2023)	This study found that Random Forest gives the best prediction.

OBJECTIVES

- Fuel consumption data is collected from an extensive dataset obtained from an authorized source, for example, Kaggle.

- Predict fuel consumption with simple ML method.

- Create State-of-Art model like CatBoost , XGBoost .

- Verify performance with measuring results with Accuracy, MAE(Mean Absolute Error), RMSE (Root Mean Squared Error).

- Compare my results with other research.

METHODOLOGY

- **Dataset**: Fuel consumption dataset from Kaggle with 500+ car records.

- **Features Used**: Engine size, number of cylinders, and city, highway, and combined MPG.

- **Target Variable**: Fuel consumption prediction as a regression problem (MPG-Miles Per Gallon).

- **Data Preprocessing**: Missing values cleaned and all features normalized.

- **Data Split**: 70% training, 15% validation, and 15% testing.

- **Baseline Models**: Linear Regression and Random Forest for initial performance benchmarking.

- **Advanced Models**: CatBoost and XGBoost for improved accuracy and robust predictions.

- **Evaluation Metrics**: Model performance measured using MAE and RMSE with cross-validation.

- **Tools Use:** Python, Scikit-learn, Pandas, NumPy and Kaggle Notebook.

EXPECTED OUTCOMES

- Prediction Accuracy is MAE/RMSE

- Fuel Consumption Error will be calculated .

- More smart prediction than the previous system

- The system will predict how much fuel a vehicle will use.

- The system will help users save fuel and reduce cost.
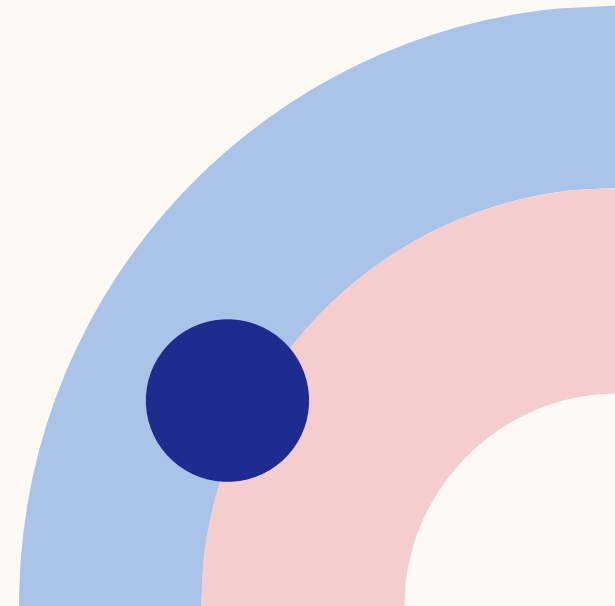
TIMELINE TABLE

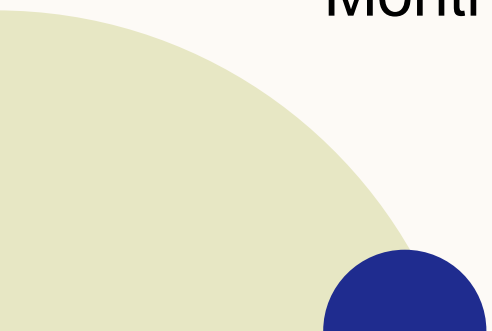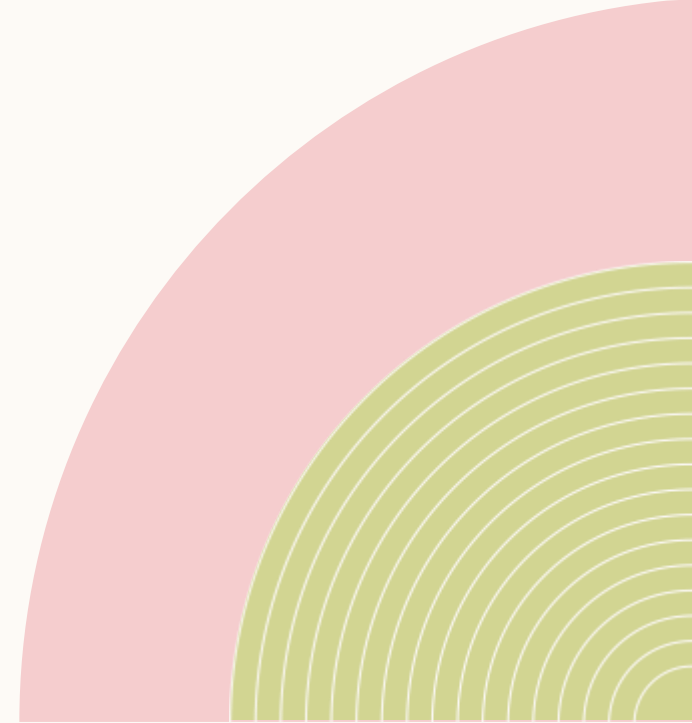Month 1: Read Literature, Fix problem + Dataset.

Month 2: View Dataset, Clean & Visualize.

Month 3: Clean Data, Encode, Normalize.

Month 4: Build Simple Model.

Month 5: Advanced Model + Tuning.

Month 6: Evaluate + Report + Slides

TIMELINE GANTT CHART

Task/Month	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
Read Literature , Fix Problem + Dataset	■					
View Dataset , Clean and Visualize		■				
Clean Data , Encode , Normalize			■			
Build Sample Model				■		
Advanced Model + Tuning					■	
Evaluate + Report + Slides						■

THANK YOU

Question and Answer