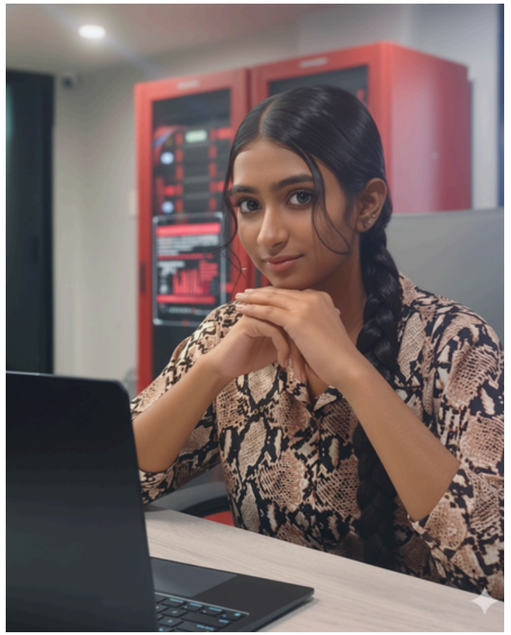
PROJECT PRESENTATION

Title : MPG_Predictor

By Krishna Priya

INTRODUCTION



Good morning, I am Krishna Priya.
We've all seen the official MPG sticker on a car. But we've also all felt the pain at the pump when that sticker number feels more like a fantasy than a fact.
Relying on manufacturer estimates alone is a gamble. They're tested in perfect lab conditions, and they often can't tell you how a car's real-world weight, horsepower, and age will truly impact your wallet.
That's an expensive, preventable mistake, and my project is built to solve it."

BACKGROUND

GENERAL OVERVIEW

"This project is a 'smart' MPG predictor. It uses a single-stage regression model to analyze a car's core features—like weight and horsepower—to produce a highly accurate, real-world fuel efficiency prediction."

HISTORY

This project is based on the classic 'Auto MPG' dataset. For decades, this kind of data was just a static report—specs you'd look up in a car magazine to see what a 1975 Ford used to get.

My project automates and supercharges this entire concept, using machine learning to turn that static, historical spreadsheet into a live, predictive engine."

GOALS

GOAL 01

- "Build a regression model to predict a car's real-world fuel efficiency, creating an accurate 'MPG Estimate' from its core technical specs."

GOAL 02

- "Deploy this regression model as a simple, interactive Streamlit web-app, turning it from a static script into a dynamic tool that anyone can use."

PROBLEMS

- "The core problem is that manufacturer MPG ratings are often unreliable. These numbers are generated in perfect lab conditions and often fail to show the true impact of key features like a car's weight, horsepower, and age.
- This gives consumers an inaccurate and misleading picture of a car's real-world fuel efficiency, making it hard to judge the true cost of ownership. We needed a 'smarter' system that could learn from historical data to provide a much more realistic and accurate MPG prediction."

HYPOTHESIS

- "Our central hypothesis is that a standard manufacturer MPG rating, by itself, is insufficient for accurately predicting real-world fuel costs.
- We propose that a machine learning model will be significantly more effective. We hypothesize that by using a regression model —trained on the complex, real-world relationships between features like a car's Weight, Horsepower, and Model Year—we can build a 'smarter' predictor that provides a far more accurate and realistic estimate of true fuel efficiency than any single lab-tested number."

METHODOLOGY

METHOD 01

- We used a Lasso Regression model, trained on the car's technical specifications (like Weight, Horsepower, and Origin), to predict its real-world fuel efficiency. This model analyzes all the features to create a single, accurate 'MPG Estimate' for any given car."

METHOD 02

- Second, we saved our trained Lasso model using joblib. We then built a simple, front-end web application with Streamlit that loads this model, allowing any user to enter a car's specs and instantly receive a live MPG prediction."

DATA ANALYSIS

"Our analysis began with the classic 'Auto MPG' dataset from the UCI repository, which contained 398 unique vehicle records. The first critical step was data cleaning, where we addressed the small number of unusable rows with missing Horsepower values.
We then transformed this raw specification sheet into a powerful, model-ready dataset. This involved feature engineering the categorical Origin feature—which simply listed 1, 2, or 3—into a one-hot encoded format that our model could properly understand.
Finally, we identified our single target variable, MPG, allowing us to build our predictive regression model."

CONCLUSION

"In conclusion, this project successfully built and deployed a 'smart' MPG predictor. We proved our hypothesis that a machine learning model could provide a far more realistic estimate than static labels.

Our Lasso regression model achieved an outstanding R-squared of 0.905 and a Mean Absolute Error of just 1.70 MPG.

The entire, end-to-end pipeline was packaged into a live Streamlit web app, turning a complex analysis into a practical, real-time tool for making smarter, data-driven decisions about fuel efficiency."

THANK YOU

By Krishna Priya