

STELLANTIS 2025

ENHANCING ETA AND ENERGY CONSUMPTION PREDICTIONS THROUGH DRIVING PATTERN ANALYSIS

Domain: Sensors Data & Time Series

Task Type: Feature Engineering & Classification

Keywords: Driving pattern, ETA Prediction, Energy Consumption, Machine Learning

PROBLEM DESCRIPTION

Stellantis currently operates production models for predicting ETA and energy consumption in their vehicles. While these models include various parameters, they do not explicitly account for driving behavior patterns. The hypothesis is that incorporating driving behavior information will improve these predictions.

The aim of this project is to identify a novel and meaningful driving style feature space from vehicle sensor data. These behavioral representations aim to capture differences that are relevant for journey time and energy consumption predictions.

DATASET DESCRIPTION

The dataset includes time-series data collected from sensors on multiple vehicles. The sensors capture various aspects of vehicle state (including coordinates, location) and environmental conditions (such as outside temperature and terrain altitude). The data requires processing to handle missing values. Initial work may be done using a public automobile telematics dataset from Kaggle before moving to the proprietary dataset. To maintain a

manageable scope, the analysis may be limited to a subset of vehicles or a specific geographic region.

PROJECT GOALS

Basic Goals:

- Develop a meaningful driving style feature space and build a classifier that can identify these patterns
- Validate the model and demonstrate its relationship to ETA and energy consumption using historical data

Advanced Goals:

- Show that using these patterns as features improves prediction accuracy for ETA and energy consumption

Stretch Goals:

- Demonstrate improvement in Stellantis' production systems using these features

Evaluation:

Model performance will be evaluated using standard classification metrics and the strength of correlation between identified patterns and actual trip metrics (ETA, energy consumption).

Deliverables:

Basic Goal:

- A processing notebook that develops the driving pattern feature space from sensor data
- A classification notebook that implements and validates the model, including analysis of relationships with trip metrics

Advanced Goal:

- A prediction notebook demonstrating how the new patterns improve ETA and energy consumption predictions
- Detailed analysis documenting the impact on prediction performance

PROJECT IMPACT

This project aims to improve performance of ETA and energy consumption predictions by incorporating meaningful driving patterns. Successfully identifying these patterns will lead to more personalized and efficient navigation solutions, ultimately improving the user experience and supporting Stellantis' commitment to innovation and sustainability.