Optimal “Green” Fleet Composition through Machine Learning

Motivation / Background

“The greatest threat to our planet is the belief that someone else will save it.”

Globally, 14% of CO2 emission comes from transport sector and this may double by 2050.

In Mexico, 26.6% of CO2 emission comes from transport sector and it is growing fast.

Coppel owns a private fleet of 2000+ trucks in Mexico. This fleet operates in diverse geographies and road conditions, making it difficult to compare their CO2 emissions.

Key Question / Hypothesis

What vehicle characteristics have the biggest impact on CO2 emissions? How to form a fleet composition optimal in costs & CO2 emissions?

Relevant Literature

Individual Vehicle-based
- Ahmed, 1973
- Chisholm, 1974
- Evans, 1989

Overall Fleet based approach
- Redmer, 2016
- Ahani, Arantes, & Melo, 2016

Green Fleet approach
- Gong & Wu, 2011
- Stasko & Gao, 2012

Methodology

- Use Machine Learning to identify characteristics that have the biggest impact on CO2 emission
- Formulate a portfolio-based optimization model using insights from Machine Learning
- Simulate different scenarios by varying permissible CO2 emission of fleet and budget constraints

Expected Contribution

- Based on Intelligent selection of characteristics in model formation
- Considers actual CO2 emissions of overall fleet and not just fuel costs
- factors in road conditions and vehicle load

Initial Data Analysis

- Maintenance Records
- Tyre Change
- Breakdown events
- Purchase Price
- Fuel Costs
- Depreciation Costs
- Discount Rates
- Resale Price
- Engine Type
- Capacity, Weight
- Transmission System
- Traffic Condition
- Gradient Variation
- Route
- Vehicle Load
- Utilization
- Elevation

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