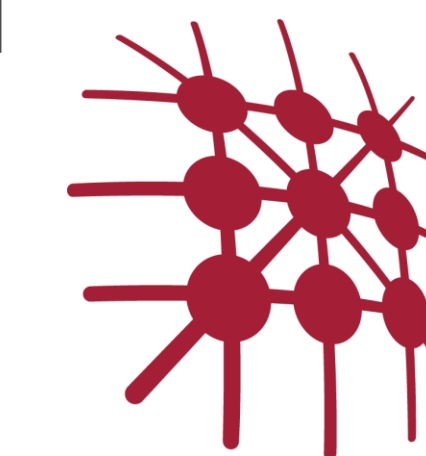
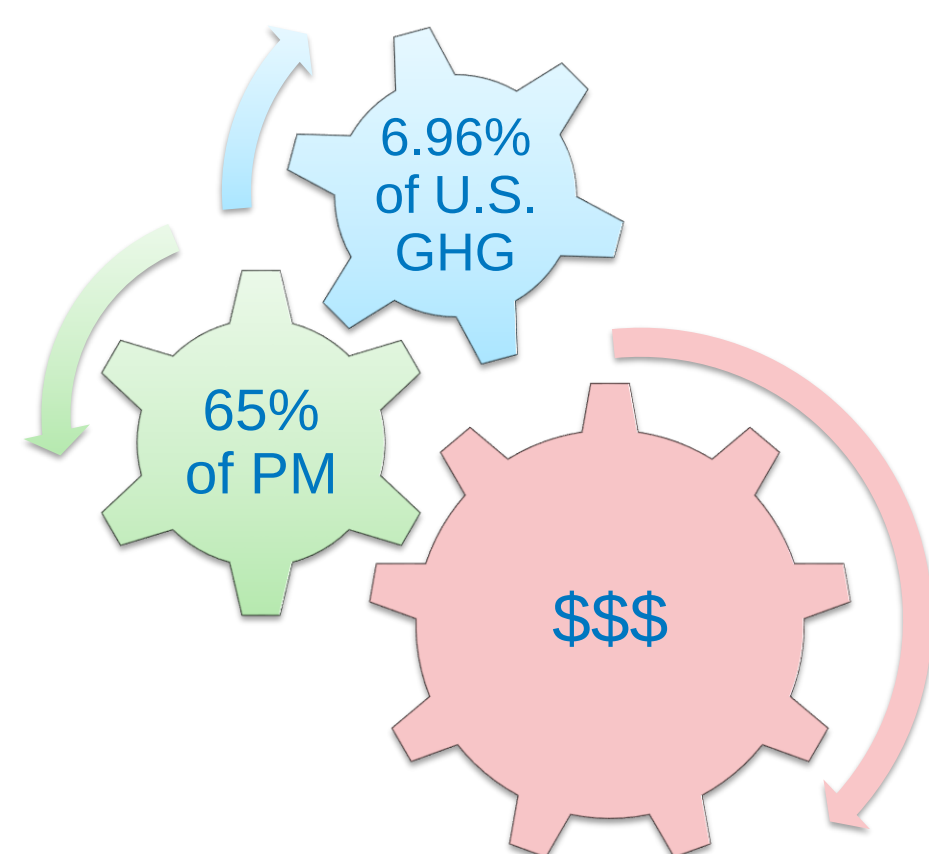


Efficiency and the Mitigation of Carbon Emissions in Semi-Truck Transportation



Motivation / Background

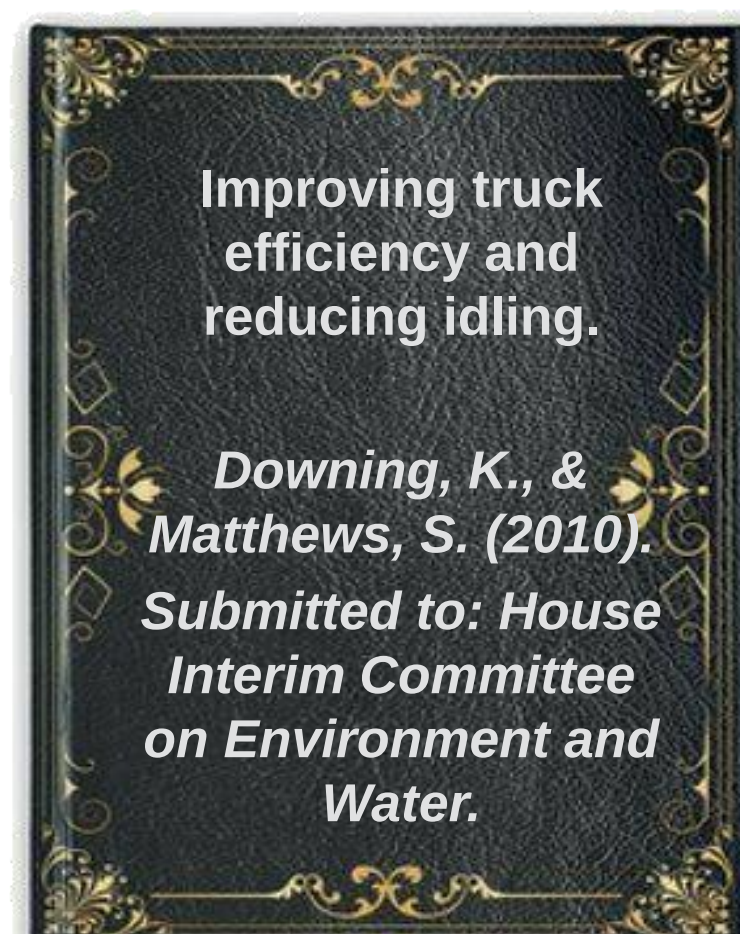
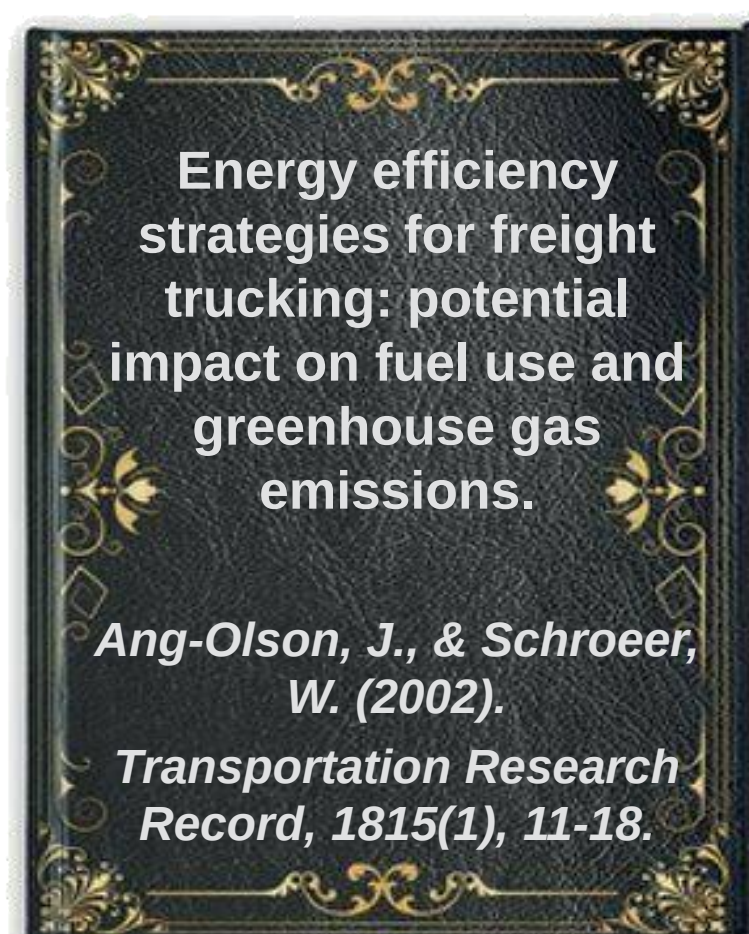
- Companies have long sought to maximize the fuel economy of their fleets. With the growing demand for green supply chains and minimized carbon emissions, as well as the EPA's more stringent requirements, the efficiency of semi-trucks is more important than ever
- The ongoing research of modifications and additions to semi-trucks has been present, though research has not been conducted at a large scale, over many years, nor while considering different terrain and cumulative effects



Key Question / Hypothesis

What variables contribute the most to the fuel economy of semi-trucks and how can we combine them to maximize efficiency?

Relevant Literature



The Problem

- The efficiency of semi-trucks has long been an issue of great importance due to the environmental and financial impacts fuel economy carries
- Modifications and additions to the vehicles have been the primary means to achieving greater efficiency
- Though which combination modifications and additions drive the greatest improvements and how to they behave over time, at scale, and in different locations?

Methodology

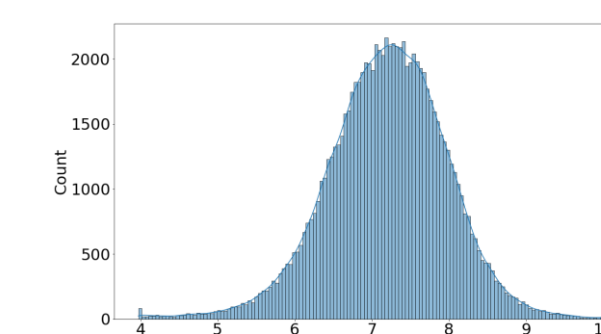


21 Testable Variables
 2,606 Trucks
 5-year Driving Data
 Data Alteration
 Dummy Variables

4
Machine
Learning
Methods

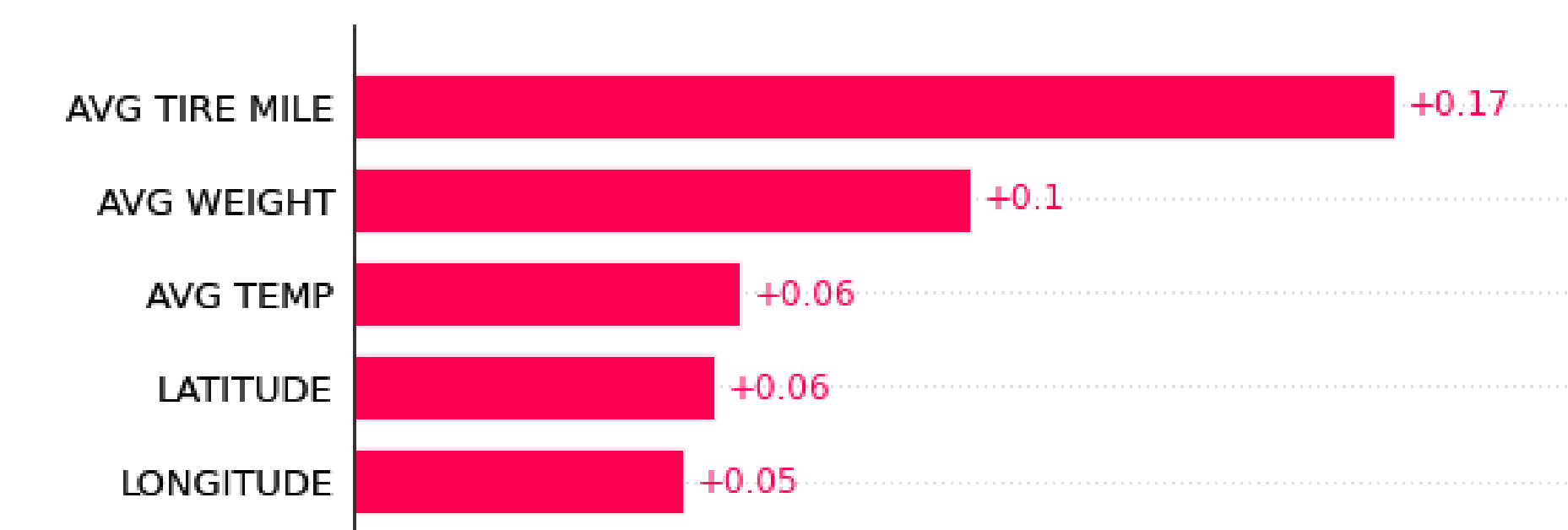
- Decision Tree
- Random Forest
- KNN Classifier
- Logistic Regression

Fuel Efficiency



Results

- K-Nearest Neighbors model gives the best results
 - Accuracy score of 0.6445
- Data set performs the best when FPM is split at median point
- Top 5 features ranked by predictive powers are AVG TIRE MILE, AVG WEIGHT, AVG TEMP, LATITUDE, LONGITUDE
- IDLE MANAGEMENT and aerodynamics are not significant factors as hypothesized



Contribution

- Created a model to be able to pinpoint to what extent 21 variables impact the fuel economy of semi-trucks
- Model can be employed to better understand and make informed decisions when purchasing
- Model can be applied to fleets across the U.S. to determine fuel economy and subsequent carbon emissions

Brody Hughes



Nan Wang

