MIT Supply Chain Management
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CO_2 Reduction in Transportation Planning using Machine Learning

MIT GLOBAL SCALE NETWORK
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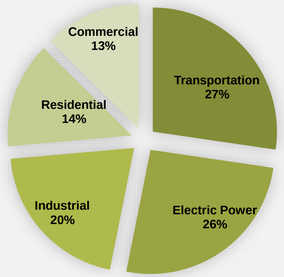
Motivation / Background

Transportation is the largest contributor to CO_2 emissions in the US, and by 2050 is expected to double.

CO_2 from Energy Consumption by US Sector, 2016



Source: US Energy Information Administration

Kg $C0_2$ / Ton-Km per vehicle-region

It is possible to reduce CO_2 emissions by making optimal truck-route assignments based on vehicle characteristics, topology and traffic conditions.

Key Questions / Hypothesis

- Are certain vehicles more efficient on given road & environmental conditions?
- How should we segment delivery areas to optimize fuel consumption?
- Which vehicle characteristics have the most effect on CO_2 emissions?

Relevant Literature

- Demir, E., Bektas, T., Laporte G., 2011. A comparative analysis of several vehicle emission models for road freight transportation.
- Díaz, J., Giraldo, N., Flórez, D., Rangel, V., Mejía, C., Huertas J., Bernal, M., 2017. Eco-driving key factors that influence fuel consumption in heavy truck fleets: A Colombian case.
- Velázquez, J., Fransoo, J., Blanco, E., Valenzuela, K., 2016. A new statistical method of assigning vehicles to delivery areas for CO_2 emissions reduction.

Process Model

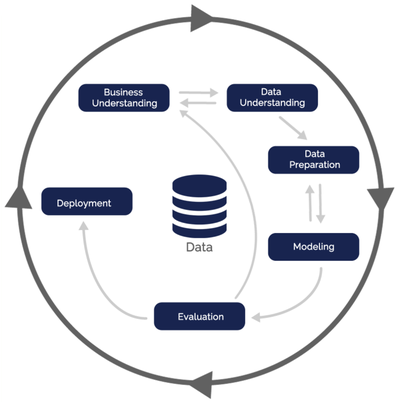
We adopt a modification of Cross Industry Standard Process for Data Mining (CRISP-DM), an iterative industry process model for data analytics with six flexible stages:

Work Products

1) Business objectives

2) Data collection and templates

3) Normalized data sources



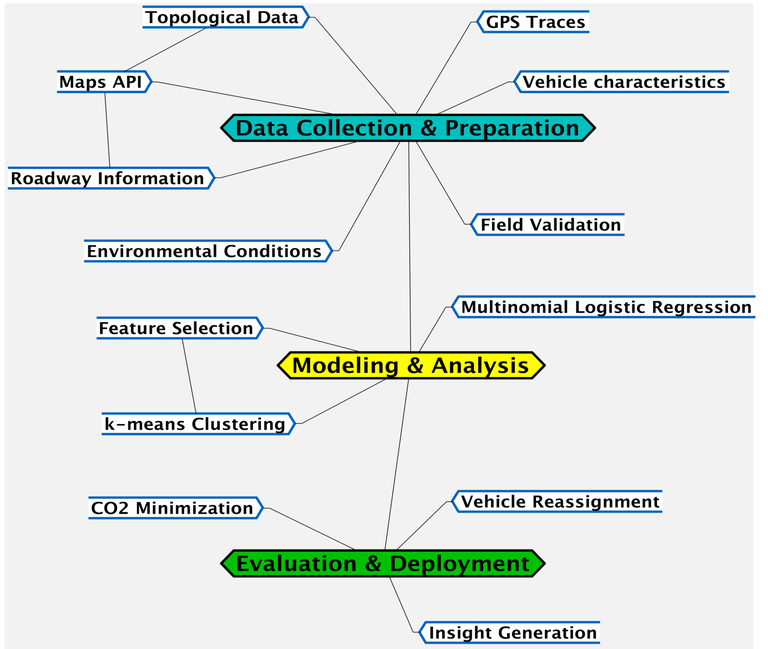
Work Products

4) Mathematical models

5) Validation and qualitative study

6) Recommendations and discussion

Methodology



Expected Contributions

- New ways to classify vehicles based on their fuel efficiency / carbon emissions
- Further insight on which vehicle characteristics have the most impact on fuel consumption
- Optimal CO_2 truck assignment per region specific to our project sponsor

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