

Average Fuel Consumption in Heavy Vehicles Using Machine Learning

Abstract:

In this paper we used vehicle travel distance rather than the traditional time period when developing individualized machine learning models for fuel consumption. This approach is used in conjunction with seven predictors derived from vehicle speed and road grade to produce a highly predictive neural network model for average fuel consumption in heavy vehicles. The proposed model can easily be developed and deployed for each individual vehicle in a fleet in order to optimize fuel consumption over the entire fleet. The predictors of the model are aggregated over fixed window sizes of distance travelled. Different window sizes are evaluated and the results show that a 1 km window is able to predict fuel consumption with a 0.91 coefficient of determination and mean absolute peak-to-peak percent error less than 4% for routes that include both city and highway duty cycle segments. The suggested ANN-based model can reliably anticipate the average fuel consumption of heavy trucks, allowing fleet operators to optimise their fuel usage and minimise expenses. This project's findings may also be beneficial to policymakers in developing laws and incentives to increase fuel economy in the transportation industry.

Keywords: ANN based model, Fuel consumption, Neural network model, Heavy vehicles

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