fuelFEET
Fuel FOT Energy Efficient Transport

Explore factors affecting fuel consumption

CAISR Centre for Applied Intelligent Systems Research

Knowledge Foundation

Fuel consumption depends on many different aspects of a vehicle, like driver behaviour or cargo, as well as external conditions such as weather and terrain.
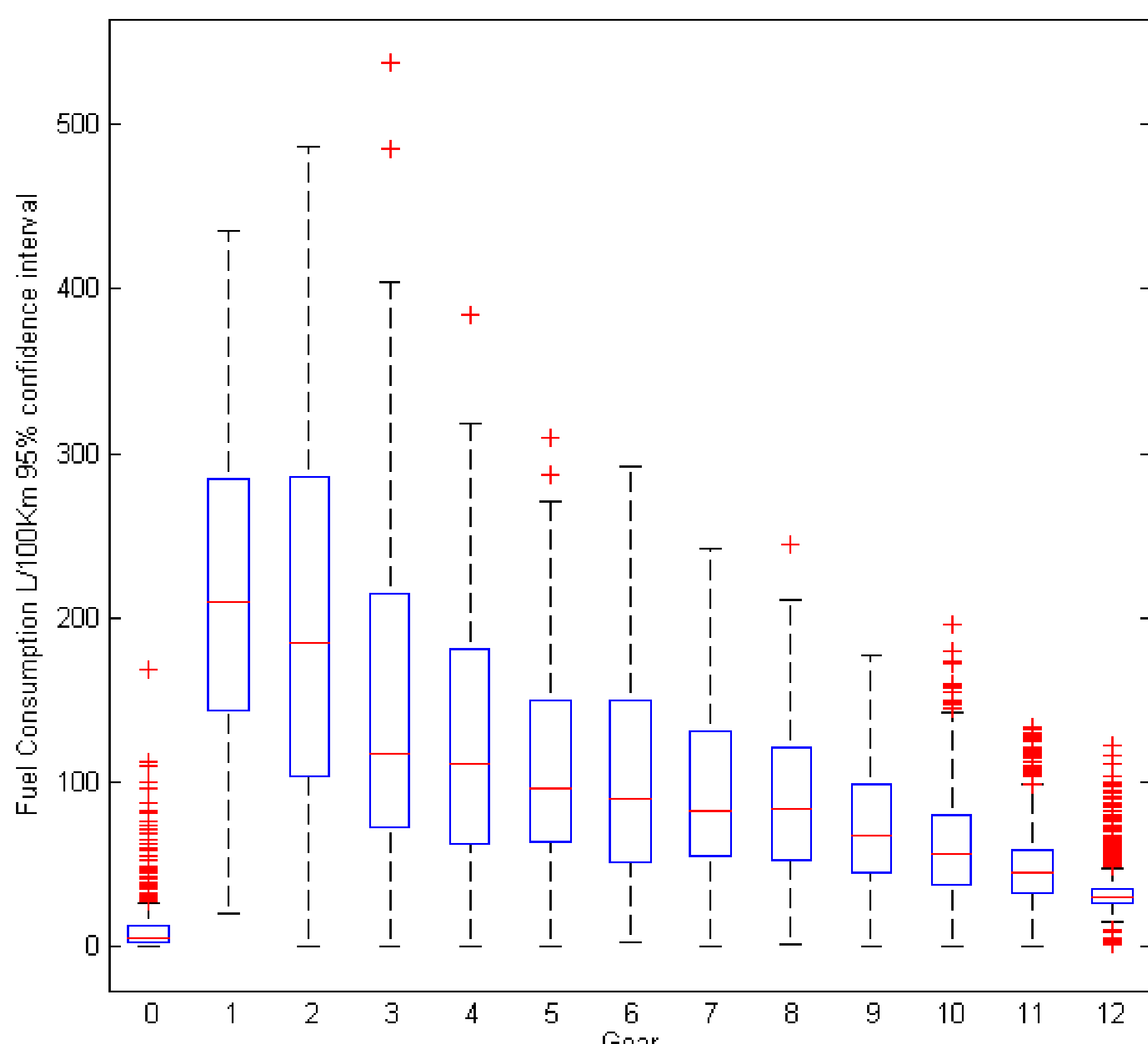
This makes it difficult to isolate influence of those factors over which driver or fleet owner has control from the inescapable ones. In the fuelFEET project we will run a pilot study on using data mining methods over available data (collected in EuroFOT and CUFF projects) to assess which are the major driver-related factors affecting fuel consumption and quantify their impact, finding a way to abstract away or compensate over external conditions.

FuelFEET project will build a framework for analysing driver's impact on fuel consumption in a way that takes relevant environmental factors into account.

This will allow us to rank and cluster drivers from a fuel consumption performance perspective, provide a list of driver behaviours that affect fuel consumption, and a quantitative estimation of their respective importance.

EuroFOT, the first large-scale European Field Operational Test on Active Safety Systems, project started in May 2008 and is finishing right now, in June 2012. The focus was on evaluating effectiveness of several different intelligent systems that assist the driver in detecting hazards, preventing accidents and making driving more efficient.

Over the course of one year, more than 1000 cars and trucks, equipped with a wide range of sensors, as well as high-tech in-vehicle active safety and efficiency technologies gathered information on roads across France, Germany, Italy and Sweden.

More than 500 different internal vehicle signals have been collected, most with 10Hz frequency, over a sum of 18 million kilometers. This is accompanied by a huge amount of recorded video, both from vehicle surroundings and cabin interiors.

eur**8**FOT

Bringing intelligent vehicles to the road

All the collected data has also been heavily processed, including time synchronization, calculating derived measures, aligning GPS information with road map systems, etc. Project of this size required preparation of the fleets, setting up data management procedures and also involved the recruitment, selection and training of the drivers. It is important that the data remains available in an SQL database, ready to be used for other purposes.

Fuel consumption per current gear, with 95% confidence interval shown as blue box, min max as dashed black line and outliers as red '+'

Fuel consumption dependents on many factors, however we can clearly see that a driver who spends more time in the highest or neutral gears will achieve lower fuel consumption, irrespective of conditions such as road characteristics, traffic, etc. At the same time, it is clearly visible that those two gears are most susceptible to exceptional behaviour, as indicated by the fact that outliers appear almost exclusively in this range. Plots like this one can be used to better understand which factors play the biggest role in driving efficiency.

The Customer Fuel Follow-up project concerns gathering data for analysis and comparison of fuel consumption and fuel efficiency. The principles are similar to euroFOT, except it is smaller in scale, and all vehicles are equipped with an additional internal fuel flow sensor. This allows high precision measurements of the actual fuel consumption at short time intervals, thus making it possible to quantify many influencing factors.

The fact that many of those factors are not well understood, in the quantitative sense at least, does make projects like this one particularly important.

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