Case Study: Engine Misfires

Engine misfires can be a serious issue when you're trying to start your vehicle. If one cylinder misfires in a four cylinder vehicle, your car loses 25% of its potential power. A misfire could also mean a faulty spark plug or vacuum leak, which are both costly repairs.

Acerta uses the gas levels exiting the exhaust pipe to identify when misfires occur. The relationship between the gas levels provides important insight into possible causes of a misfire. As engine combustion occurs, the concentration of the gas levels reduce to zero with the exception of CO^2; the main gas that is released out of the exhaust pipe. Acerta learns how the relationships of these gas levels affect the efficiency of the engine, a key indicator to its health.

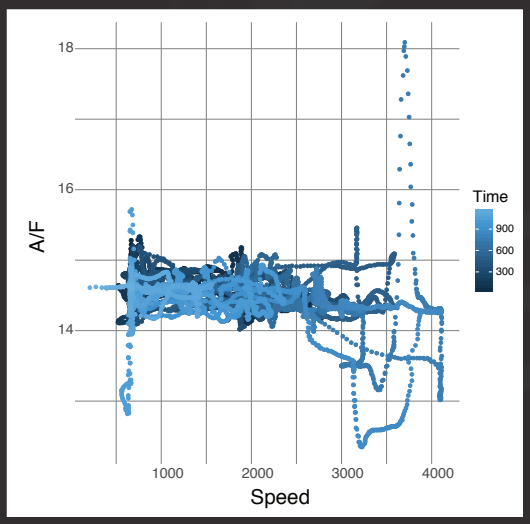
True misfires are hard to detect, but they can occur when the right conditions are met such as the air-to-fuel (A/F) ratio spiking with no change in the speed.

Acerta is trained to understand the different conditions and minimize the false positives that are generated. The A/F Ratio vs Speed figure shows abnormal values for the A/F ratio near engine speeds of 3,500 km/h. This indicates that a lean misfire has occurred and there isn't enough fuel going into the cylinders.

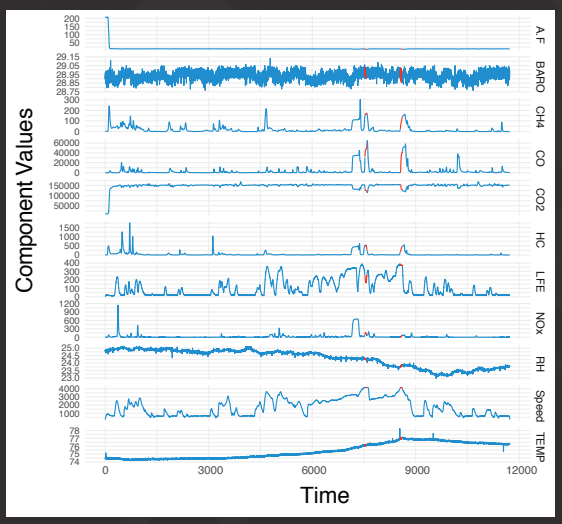
Acerta's proprietary algorithms automatically highlight the misfires in the exhaust data as seen in the Misfire Detection figure below. With minimal configuration, our platform understands the variances in the different input values to highlight the regions with probable misfires. The values from the misfires are then used to create thresholds. This allows our platform to identify the specific misfires that occur, whether it's a rich failure or exhaust leak and help engineers diagnose the likely causes more accurately in a timely manner.

Identifying misfires early, your vehicles can avoid a mechanical breakdown such as a blown cylinder head gasket and avoid a costly replacement in the future.

A/F Ratio vs Speed



Misfire Detection



Acerta

Machine learning for predicting vehicle failures

info@acerta.ca
www.acerta.ca
+1 (519) 729 – 5543
Waterloo, Ontario, Canada