DATA SCIENCE USE CASE: PARAMETER IDENTIFICATION AND FEDERATED LEARNING FOR LIFETIME PREDICTION

Battery Analytics for Vehicle Fleets

Motivation
The battery is by far the most valuable component of electric vehicles, and for all manufacturers and mobility providers, total cost of ownership (TCO) is key to staying competitive. Hence, the main goal is to optimize battery operation in terms of power, efficiency, safety and lifetime.

Why Data Science and Artificial Intelligence?
Estimation of the State of Health (SoH) of a battery system is currently done by a preprogrammed battery management system (BMS) in the vehicle. By collecting battery data from the entire fleet, enhanced data driven models can be trained via machine learning. This enables a better estimation of current SoH and predictions of future behavior.

Approach
AVL applies secure battery data acquisition, connectivity, analytics and adaptation of operation strategies by using ML-based modeling techniques in combination with knowledge and models from battery system and BMS development.

Input
- Parameters of battery system and BMS
- Metadata and other time series data from vehicle operation

Output
- Precise estimates of SoH of each battery system in the fleet
- Preventive failure detection (safety warnings) and predictive maintenance indications
- Recommendations for optimization
- Prediction of remaining useful lifetime

Benefits
- Improved operation strategy: driving, charging, parking
- Optimization of charging time, range and lifetime
- Reduction of maintenance and replacement costs
- More precise planning of battery replacement costs and determination of battery's 2nd life value
- Valuable input for next generation battery system development based on real-world fleet operation data

FIND OUT MORE

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