Driving Pattern Recognition for Adaptive Hybrid Vehicle Control

Author(s):
• Lei Feng
• Wenjia Liu
• Bo Chen

Affiliated:
• Michigan Technological Univ

Abstract:
The vehicle driving cycles affect the performance of a hybrid vehicle control strategy, as a result, the overall performance of the vehicle, such as fuel consumption and emission. By identifying the driving cycles of a vehicle, the control system is able to dynamically change the control strategy (or parameters) to the best one to adapt to the changes of vehicle driving patterns. This paper studies the supervised driving cycle recognition using pattern recognition approach. With pattern recognition method, a driving cycle is represented by feature vectors that are formed by a set of parameters to which the driving cycle is sensitive.

The on-line driving pattern recognition is achieved by calculating the feature vectors and classifying these feature vectors to one of the driving patterns in the reference database. To establish reference driving cycle database, the representative feature vectors for four federal driving cycles are generated using feature extraction method. The quality of representative feature vectors with different feature extraction methods is evaluated by examining the separation of feature vectors in the feature space and the success rate of the pattern recognition. The performance of the presented adaptive control strategy based on driving pattern recognition is evaluated using a powertrain/propulsion simulation and analysis software - Autonomie.