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Abstract

Optimization of Automotive Engine Power Performance under
Numerical and Nominal data

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In automotive engine setup, engineers are required to deal with a huge amount of data obtained from engine test beds. In the preliminary stage of an engine tune-up, the automotive engineer has to understand the correlation between each set of adjustable parameters and a set of engine output variables (such as: brake-specific fuel consumption, output torque and emission). Those data must be analyzed in order to give the best performance of the engine. However, the correlation is difficult to be found. The reason is that no general mathematical model exists for the engine. In order to reduce the expenditure and time in engine testing, it is very important to develop a mathematical model for engine setup optimization. This thesis presents an investigation of a novel LS-SVM modeling algorithm plus one-of-n remapping

method for modeling of engine power performance under numerical and nominal data.

Then Quasi-Newton method and Genetic algorithm (GA) are applied to the LS-SVM

model in order to automatically determine the optimal engine torque subject to

user-specific constraints. This thesis also presents the construction, validation and

accuracy of the optimization results. Experimental results show that LS-SVM together

with GA produce the best optimization result.