Application of artificial neural network to predict vehicle NOx emission and fuel consumption

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1. Introduction

• Several recent studies have shown that diesel vehicle emission has exceeded standards such as EU 6 by a large margin.
• The ever increasingly stringent restrictions over vehicle emission gives rise to the significance of NOx emission prediction to understand, optimise and therefore meet emission standards.

3. Neural network improvement

The test using MATLAB nftool default settings does not yield satisfactory results, therefore several improvement techniques are carried out to modify NN structure:
• Initialisation of network weights and biases
• Increase the number of hidden neurons (10 to 100)
• Different training algorithms (Levenberg-Marquardt, Baysian Regularisation, Scaled Conjugate Gradient)
• 5-sec time-frame sampling

4. Results and discussion

Finalised NN structures yield satisfactory results for all 5 vehicle tested, correlation R values are all approximately above 0.78, especially for vehicle 3 (0.910 for NOx emission and 0.934 for fuel consumption)

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REFERENCES