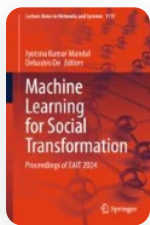


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Application of Neural Network for Reducing Emission and Optimizing Performance of Hydrogen with Biofuel CI Engine

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Abstract

Fuel selection influences internal combustion engine (ICE) performance and toxic emissions. However, predictive monitoring plays an imperative function in the validation and support of the machine. It optimizes engine running performance, reduces

emissions, and increases efficiency. This study investigates the emission reduction and optimization of brake thermal efficiency (BTE) using a blended fuel—hydrogen, biofuel, and water on a one-cylinder compression ignition (CI) engine. Simulink simulations are used to collect data, which is then preprocessed and analyzed using advanced feature extraction to increase prediction accuracy. In this paper, a hybrid deep reinforcement learning, and artificial neural network (DRL-ANN) is initiated and designed to predict CI engine emission attributes. To optimize the prediction model, this method combines DRL and neural networks. As a result, the model achieved superior predictive accuracy compared with earlier approaches regarding accuracy (BTE 0.96851, CO 0.95124, HC 0.96624), mean-squared errors (BTE 0.00018, CO 0.00058, HC 0.00055) and R^2 (BTE 0.95478, CO 0.94694, HC 0.97015). This study demonstrated the prediction model's efficacy in optimizing CI engine running characteristics and fuel types.

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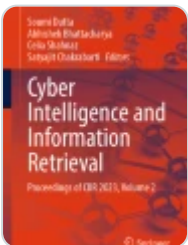
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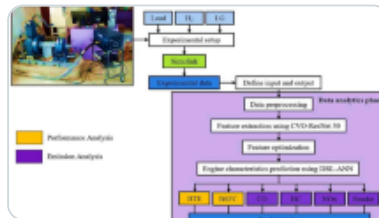
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