عنوان مقاله:

Application of Machine Learning Techniques to Predict Haul Truck Fuel Consumption in Open-Pit Mines

محل انتشار:

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خلاصه مقاله:

The haul trucks consume a significant energy source in open-pit mines, where diesel fuel is widely used as the main energy source. Improving the haul truck fuel consumption can considerably decrease the operating cost of mining, and more importantly, reduce the pollutants and greenhouse gas emissions. This work aims to model and evaluate the diesel fuel consumption of the mining haul trucks. The machine learning techniques including multiple linear regression, random forest, artificial neural network, support vector machine, and kernel nearest neighbor are implemented and investigated in order to predict the haul truck fuel consumption based on the independent variables such as the payload, total resistance, and actual speed. The prediction models are built on the actual dataset collected from an Iron ore open-pit mine located in the Yazd province, Iran. In order to evaluate the goodness of the predicted models, the coefficient of determination, mean square error, and mean absolute error are investigated. The results obtained demonstrate that the artificial neural network has the highest accuracy compared to the other models (coefficient of determination = ۰.۹۰۳, mean square error = ۴۸۹.۱۷۳, and mean absolute error = ۱۳.۴۴۰). In contrast, the multiple linear regression exhibits the worst result in all statistical metrics. Finally, a sensitivity analysis is used to evaluate the significance of the independent variables.

کلمات کلیدی:

Fuel consumption, Haul truck, Machine learning, Prediction, Open-Pit Mine