Machine Learning for Bi-Electrode Sensor Data of Weathering Steels in Thailand

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Corrosion of weathering steels (3Ni0.4Cu and Q420NH) were monitored by bi-electrode sensor via electrochemical impedance spectroscopy (EIS) and electrochemical frequency modulation (EFM) techniques at Songkhla, Thailand for 12 months. Weather parameters were also recorded. Sensor output from both corrosion sensors and weather sensors were analyzed by machine learning model. The most important factors influencing corrosion rate of tested weathering steels are relative humidity, temperature, and rainfall. The fraction of test and train dataset as well as current range of dataset were varied to obtain the best correlation between corrosion rates and climate factors. Accuracy of prediction were evaluated based on mean absolute error (MAE), square mean error (MSE), and R^2-score. Random Forests (RF) model can predict corrosion rate at highest accuracy compared to support vector regression (SVR) model. Improvement of prediction can be achieved by applying hyperparameter tuning techniques. This work demonstrates the application of machine learning model on corrosion monitoring data which leads to digital transformation in corrosion prediction technology.