Non-destructive test model for evaluating scour safety of railroad piers

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In order to evaluate the stability of the railway bridge substructure, a series of impact vibration tests were performed, and the response dominant frequency was calculated by analyzing the measured acceleration time history data. The specifications of the experimental pier were referenced from the as-built design data, and when the data was lost, it was secured by conducting an on-site investigation. An impact vibration test according to the progress of scour was performed on one pier scheduled to be dismantled, and based on this, it was confirmed that the response dominant frequency of the pier can be applied as an evaluation index for scour of the pier. In addition, the response dominant frequency was calculated through an impact load test on 46 piers of 5 bridges in actual operation, and the scour stability of the bridge was evaluated by comparing this with the Japanese standard formula. In addition, the safety of the bridge was predicted through machine learning techniques based on a database built from impact load experiments on the bridge. We constructed a 1,159 database consisting of model pier test data and numerical analysis data to analyze the accuracy of the algorithm. We studied safety diagnosis prediction accuracy using three machine learning algorithms: Support Vector Machine (SVM), Decision Tree (DT), and Logistic Regression. The algorithm was evaluated using evaluation indices based on the confusion matrix. As a result, the highest accuracy of 95.9% was achieved when using a support vector machine, a binary classification model that predicts the borderline between the two classes, safe and unsafe.