Proposal and Evaluation of Pavement Deterioration Prediction Method by Recurrent Neural Network

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***Abstract*— The pavement deterioration prediction model is a basic module of the PMS (Pavement Management System), and its prediction results influence the decision making of pavement administrators. Hence, it is very important to improve prediction accuracy. There is a rutting depth as a major indicator showing the state of pavement used in PMS. In this research, we propose a method to predict rutting depth by introducing a technique to improve prediction accuracy by suppressing over-fitting by dropout and gradient clipping in the recently rapidly developing NN (Neural Network) model. In addition, since pavement survey data are time series data that were inspected at the same place multiple times, we applied the RNN (Recurrent Neural Network) model which can model time series data. The proposed method was applied to rutting depth prediction of periodic survey data of Kawasaki city in Japan from 1987 to 2016. In order to compare prediction accuracy, we predicted three years later using proposed method and MLR (Multiple Linear Regression) which is a typical regression model and MLP (Multi-Layer Perceptron) which is most frequently used among NN models. The RMSE and correlation coefficient R between the prediction result and the measured value were compared. We validated that the prediction ability of RNN is the highest.**

***Keywords*—pavement management system; pavement condition survey; recurrent neural network; neural network; machine learning;**

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