

Prediction of ground surface settlement during tunneling using artificial neural network

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Abstract

Tunnel excavation in the shallow soft ground often induces ground surface settlements which threaten the stability of existing infrastructures in urban areas. Controlling the amount of ground surface settlements during tunneling is one of the key issues for tunneling engineers. Numerous researches to predict the degree of the surface settlement have been attempted with analytical, empirical and/or numerical analysis methods. However, these prediction methods have intrinsic limitations that they do not completely consider all key aspects of settlement-inducing parameters, i.e., geotechnical properties, various geometric profiles and operating conditions of the TBM machine at the site. In this study, the applicability of the artificial neural network (ANN) to predicting the ground surface settlement was scrutinized by implementing the settlement data measured at a tunnel site in Hong Kong. Settlement inducing parameters representing the tunnel geometry, TBM operating conditions, and geological conditions were collected and analyzed. The optimum structure of the neural network was investigated through a parametric study and compared using a few representative training algorithms.

Keywords: *Surface settlement, Tunneling, TBM, Artificial Neural Network*

Biography

Dongku Kim is a Ph.D. student at the Department of Civil Engineering, Korea University.

As a member of the Geosystem Laboratory, he has been participating in numerous national funded researches under the advice of Professor Hangseok Choi.

Research interests: tunneling, slope stability, application of machine learning to civil engineering, smart city project.