Development of an Autopilot Model for Shield Tunneling Machines using Machine Learning

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ABSTRACT

Although a shield tunneling machine should excavate a tunnel along its planned alignment, deviations occur between the planned alignment and the actual result. In this case, to decrease the deviation from the planned alignment gradually, a target alignment that should be achieved in construction is generated. However, because excavation managers and operators are aging, their skills may be lost in the near future. Artificial intelligence is expected to play an important role in automating the operation of shield tunneling machines, but there are several limitations to systems proposed in previous studies. Therefore, in this research, an autopilot model was developed to automatically compute operation parameters for excavating along the target alignment. The results showed that the deviation between the predicted position of the shield machine by the optimum operation parameters of the autopilot model and the target alignment position was smaller than the measured deviation at an existing tunnel that was previously constructed.