Development of PCI Prediction Models for Distress Evaluation of Asphalt Pavements

Authors : Hamid Noori

Abstract : A scientific approach is essential for evaluating pavement surface conditions at the network level. The Pavement Condition Index (PCI) is widely used to assess surface conditions and determine appropriate treatments. This study examines three national highways using a network survey vehicle to collect distress data. The first two corridors were used for evaluation and comparison, while the third corridor validated the predicted PCI values. Multiple linear regression (MLR) initially modeled the relationship between PCI and distress variables but showed poor predictive accuracy. Therefore, K-nearest neighbors (KNN) and artificial neural network (ANN) models were developed, providing better results. A methodology for prioritizing pavement sections was introduced, and the pavement sections were based on PCI, IRI, and rut values through Combined Index Rankings (CIR). In addition, a methodology has been proposed for the selection of appropriate treatment of the ranked candidate pavement section. The proposed treatment selection process considers PCI, IRI, rutting, and FWD test results, aligning with a customized PCI rating scale. A Decision Tree was developed to recommend suitable treatments based on these criteria.