

This topic is “practice ready.” Yes No

ANN Models to Correlate Structural and Functional Conditions in AC Pavements at Network Level

Fawaz Alharbi¹ and Omar Smadi²,

Abstract

Artificial Neural Network (ANN) models are inspired by human brain process. ANN contains large number of neurons to process input data, and each neuron is connected to other neurons by links to adjust weight through processing which can be used to explore information form data. ANN models were developed to estimate the correlation between structural capacity and functional conditions in Asphalt Cement (AC) pavements at the network level. To achieve this objective, the relevant data were obtained and integrated from the Iowa Pavement Management Program (IPMP) including construction parameters, traffic loading and subgrade stiffness, and Iowa Environmental Mesonet (IEM) for climate data. The ANN model proves its ability to learn and generalize from the input data. Overall, roughness and rutting data were found to be appropriate indicators of the structural capacity. Since the deflection tests are expensive and require experience and knowledge to deal with such data, this approach might be feasible for small transportation agencies (cities and counties) that don't have these capabilities.

Keywords: Artificial Neural Network - AC pavement, Functional Performance - Iowa pavements - Structural performance

¹ Graduate Student, Institute for Transportation, Iowa State University; 2711 South Loop Drive, Suite 4700, Ames, Iowa, 50010; phone (515) 357-9245; fax (515) 294-0467; email: falharbi@iastate.edu

² Director; Center for Transportation Research and Education, Institute for Transportation, Iowa State University; 2711 South Loop Drive, Suite 4700, Ames, Iowa, 50010; phone (515) 294-7110; fax (515) 294-0467; email: smadi@iastate.edu