# Integration and Evaluation of Automated Pavement Distress Data in INDOT's Pavement Management System

Introduction

This study was conducted in two parts. The first part established and demonstrated a framework for pavement data integration. This is critical for fulfilling QC/QA needs of INDOT's pavement management system, because the precision of the physical location references is a prerequisite for the reliable collection and interpretation of pavement data. Such consistency is often jeopardized when the data are collected during different years, due to changes in the vendor, the inventory, or the referencing system or reference points. This

study therefore developed a "lining-up" methodology to address this issue. The applicability of the developed methodology was demonstrated using 2012 to 2014 data from Indiana's highway network.

The second part of the study developed correlations and probability distributions for the different types of pavement distresses using machine learning algorithms. That way, the severity of any one type of distress can be estimated based on known severity of other distresses at that location. The 2012 to 2014 data are from I-70, US-41, and US-52, and the distress types considered are cracking, rutting, faulting, and roughness.
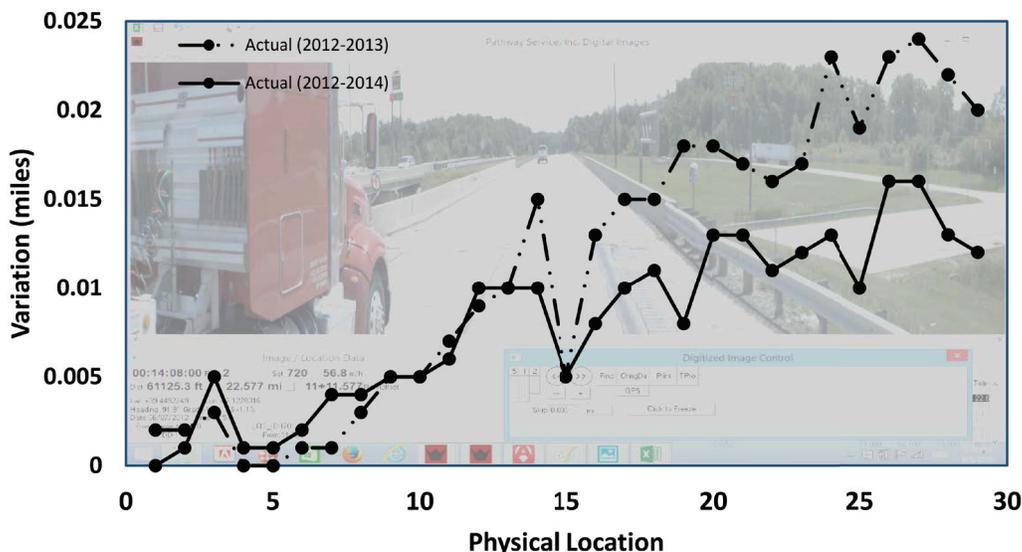
Differences between the RRs of 29 identified physical locations on US-52 measured in 2012, 2013, and 2014.

Findings

The results showed that the errors in the non-lined-up data are significant as they lead to mischaracterization of the true pavement condition. This could lead to the reporting of unreliable information regarding the road network condition to the decision makers, ultimately resulting in inappropriate condition assessments and prescriptions. Benefits of the methodology reverberate throughout the management functions and processes associated with highway pavements in Indiana, including pavement

performance modeling; optimal timing of maintenance, rehabilitation, and reconstruction (MRR); assessing the effectiveness of MRR treatments and schedules; and, overall, responsible and cost-effective stewardship of the pavement infrastructure.

The second part of the study developed correlations for the different types of pavement distresses using machine learning algorithms. Models were developed to relate surface roughness (IRI) to pavement cracks, and between the different crack types, with varying degrees of confidence across the different crack types and road functional classes. In addition, for each functional class of highway and crack type, models were built to relate crack depth to crack width. This concept can also be applied to other distress types, such as spalling, bleeding, raveling, depression, shoving, stripping, potholes, and joint problems, when appropriate data are available.

Implementation

This study can be used by personnel at INDOT's Pavement Management Office to make more reliable assessments of the pavement condition of the state highway systems.

Specifically, knowledge of true pavement condition can help facilitate the management functions and processes associated with highway pavements in Indiana.

A core group of pavement engineers and managers at INDOT under advisement of FHWA can further define and select implementation strategies relative to agency practices. The principal mission of this implementing panel could be to advance and institutionalize the most practicable methods outlined in this research report.

Recommended Citation for Report