

R.S. ADHIKARI, O. MOSELHI, A. BAGCHI. **Automated prediction of condition state rating in bridge inspection.** *Gerontechnology* 2012;11(2):81; doi:10.4017/gt.2012.11.02.153.00 **Purpose** This paper presents a new automated method to predict condition state rating in bridge inspection. The method is designed to identify proper risk-based inspection interval by neural networks and image processing techniques. **Method** The surface defect considered in this research work is the loss of surface portion (scaling) of concrete due to freeze-thaw action based on Ontario Structure Inspection Manual (OSIM)<sup>1</sup>. Earlier, digital camera has been effectively used for identification of cracks in concrete bridge inspection. The research presented in this paper uses digital camera and artificial neural networks (ANN) for defects identification and rating purposes. The problem associated with scale calibration while zooming of the camera to capture the details of defects is solved either by known dimension of existing nearby elements of the bridge or via artificial objects with known dimensions in the picture frame. Determination of depth of defects, however, poses another challenge when 2D picture frames are used in this process. Red, green and blue (RGB) color profile is used to estimate the depth of defects. Various image processing techniques are used to extract the feature vectors to characterise and quantify defects. Subsequently, an ANN model is developed to predict the depth of defects based on 7 attributes obtained from the image processing. Condition state rating of scaling defects is then modelled using a developed back propagation neural network model (BPNN). **Results & Discussion** The developed model is capable of predicting condition state (CS) rating of scaling defects as light, medium, and severe with correlation coefficient (CR) of 99% (*Figure 1*). The proposed method is aimed to identify the proper risk-based bridge inspection interval which can significantly shorten the inspection interval and can assist in planning and executing necessary maintenance and rehabilitation work.

#### Reference

1. OSIM (Ontario structure inspection manual). Ontario Ministry of Transportation. 2008; [www.ogra.org/lib/db2file.asp?fileid=24271](http://www.ogra.org/lib/db2file.asp?fileid=24271); retrieved April 1, 2012

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**Affiliation:** Concordia University, Montreal, Quebec, Canada; E: ram\_adhikari91@yahoo.com

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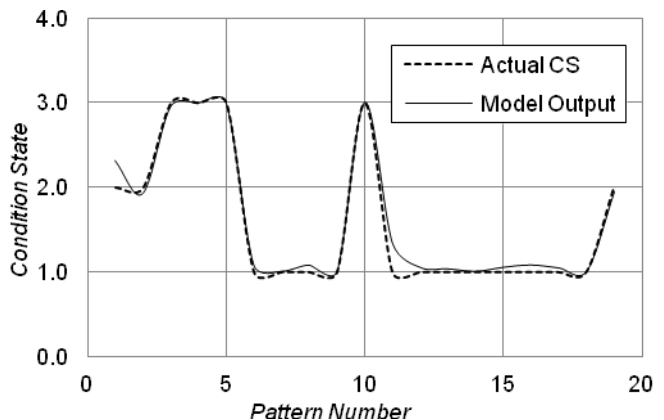


Figure 1. Actual Condition State Vs Model Output