ID: 18

Primary Contact:
Zhouxiang Fei, University of Strathclyde
Glasgow, United Kingdom

All Presenters:
Zhouxiang Fei, University of Strathclyde **(Primary Presenter)**
Graeme West, Univeristy of Strathclyde
Paul Murray, The University of Strathclyde
Gordon Dobie, The University of Strathclyde

Submission Type:
General

Title:
AUTOMATED DETECTION OF CRACK FEATURES IN NUCLEAR SUPERHEATERS USING DEEP LEARNING WITH AUTOMATICALLY LABELLED DATASETS

Abstract:

Inspection for crack features in nuclear power plant structures is important to maintain safe continued operation. Deep learning is considered useful for automated detection of cracks in videos and images. However, one major overhead of the deep learning route is the manual labelling cost of the training, validation and testing datasets. Specifically, the manual preparation of datasets could require excessive labour to label a sufficient number of images and is prone to inconsistent labelling standard. This presentation introduces an innovative automated labelling technique based on binary masks to overcome these challenges. The proposed technique can automatically generate a sufficient number of labelled images under a consistent labelling standard. As a showcase study, a convolutional neural network (CNN) for crack feature detection in superheaters is implemented using the datasets produced by the novel automated labelling technique. The result shows that the proposed labelling technique can significantly accelerate the creation of datasets to train and evaluate an autonomous crack-feature detection system. Due to the black-box nature of the CNN classification operation, the explicability of the classification results is demonstrated in the presentation to help understand the decision-making mechanism.

Keywords (Optional):
Automated labelling technique, crack detection, deep learning, nuclear power plant inspection, remote visual inspection support

Presentation:
View File - 18_Presentation_1129054032.pptx