

**DETECTING AND EVALUATING SURFACE CRACK
DEFECT OF BUILDING STRUCTURE AND
INFRASTRUCTURE ELEMENTS USING DIGITAL IMAGE
PROCESSING APPROACH**

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ABSTRACT

The current surface crack detection and length assessment on the damaged structures using the visual inspection method is conducted using manual observation based on trained eye's building inspector. The accuracy of this method is significantly relying upon various factors including the experience and training of the inspector that inspect the surface crack properties. In addition, the assessment of such cracks by inexperience inspectors will arise in several interpretation results. This method also suffers from the time consuming nature that contributes to substantial operation cost on evaluating the surface crack in large scale problem. Therefore, an innovative technique that manipulating the Digital Image Processing technology was developed to detect and estimate the surface crack length on civil engineering structures by using images that is not depending on inspector's background on crack assessment. The thresholding algorithm was developed to detect the crack area and estimate the crack length by using MATLAB version 2015a and 2017a software. Beam sample was casting and simulated the crack using single point load of flexural strength test. Various of cracks was taken at various offset, distance of camera to beam sample, and angle of camera itself to create a calibrating graph to determining one pixel represent how much centimeter that can be used for onsite crack. Validation results have been done for crack at building and drainage structure. Various ways was done such as; few offset of camera, different distance between crack and camera, with and without existence of light and different angle of camera to ensure that the calibration graph can be approved. By using this technique, the surface cracked area on damaged structures was detected appropriately and the crack length was estimated with small error of 0.5 to 4.62 percent from the actual crack length observed by the visual inspection method. The assessment of the inspection work can be completed within few minutes as compared to time consuming traditional visual inspection method.

Keyword: Crack Length, Damaged Structures, Digital Image Processing, Surface crack, Visual inspection method.

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