

# Automating Structural Health Assessment: A Machine Learning Approach for Identifying Concrete Defects

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Structural health monitoring (SHM) of large-scale structures with the aid of contact sensors is still challenging and problematic in many practical applications. Contactless crack identification methods can be categorized into two main groups based on measurement techniques [1,2]. The first one is Computer Vision-based approach, which uses cameras to capture images of the structure. However, the drawback of CV-based techniques is related to the requirement of good lighting conditions and may need multiple images from different angles to capture all cracks. The second one is Terrestrial laser scanning, which emits laser pulses and measures the reflected light to create a 3D point cloud of the structure. TLS is less reliant on lighting conditions and can capture data from a single scan position.

The goal of this study is the development of a CV-based methodology for reliable identification of different structural defects, including concrete cracks, spalling and delamination. The effectiveness of the proposed methodology has been demonstrated on labeling and prediction of real viaduct located in Budapest. For that purpose DeepLabV3 neural architecture has been used.

[1] Billie F. Spencer, Vedhus Hoskere, Yasutaka Narazaki, *Advances in Computer Vision-Based Civil Infrastructure Inspection and Monitoring*, Engineering, Volume 5, Issue 2, 2019, Pages 199-222, ISSN 2095-8099

[2] Chen X, Li J, Huang S, Cui H, Liu P, Sun Q. *An Automatic Concrete Crack-Detection Method Fusing Point Clouds and Images Based on Improved Otsu's Algorithm*. *Sensors*. 2021; 21(5):1581