Road Crack Detection Using Deep Convolutional Neural Network and Adaptive Thresholding

This paper has worked by using CNN to Adapt thresholding to detect the road crack. The work has proceeded in two steps: image classification and the other is image segmentation. Here CNN is being used mainly for the image classification part as it works as a feature extractor and determines the crack existence. One term is added: ReLU, representing a rectified linear unit, which is the most popular activation function for deep neural networks.

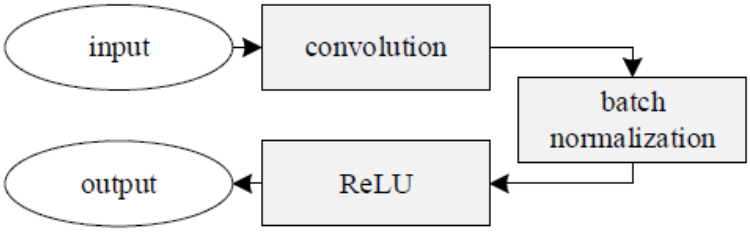

Figure 1. Image classification using CNN and ReLU

Figure 2. Bilateral filtering and image segmentation; (a) original positive image; (b) filtered positive image; (c) segmentation result

An adapting thresholding approach has been used for the segmentation process. In the segmentation part, before approaching the adapting thresholding, a bilateral filter has been used to smooth the input images. Here the primary technique of this work is adapting thresholding for segmentation. This thresholding method hypothesizes that the filtered image comprises two parts: foreground (cracks) and background (road surface). To find the best threshold δ, formulate the thresholding problem as a 2D. This 2D histogram using k means clustering and divided into four regions, and these four regions contain different vectors of foreground and background. Based on this, the 2D histogram thresholding formula can segment the crack images.

Here, this paper's method 2D histogram thresholding can only segment the crack-based area, but the proposed model can detect the damaged road and segment its damaged part. For the proposed model, things need to change in the 2D histogram part because its work segmented the crack area only, and the goal is segmented in the whole damaged area.

References:

[1] Fan, R., Bocus, M. J., Zhu, Y., Jiao, J., Wang, L., Ma, F., ... & Liu, M. (2019, June). Road crack detection using deep convolutional neural network and adaptive thresholding. In 2019 IEEE Intelligent Vehicles Symposium (IV) (pp. 474-479). IEEE.