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An Investigation on Smartphone-Based Machine Vision System for Inspection

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Abstract : Machine vision system for inspection is an automated technology that is normally utilized to analyze items on the production line for quality control purposes, it also can be known as an automated visual inspection (AVI) system. By applying automated visual inspection, the existence of items, defects, contaminants, flaws, and other irregularities in manufactured products can be easily detected in a short time and accurately. However, AVI systems are still inflexible and expensive due to their uniqueness for a specific task and consuming a lot of set-up time and space. With the rapid development of mobile devices, smartphones can be an alternative device for the visual system to solve the existing problems of AVI. Since the smartphone-based AVI system is still at a nascent stage, this led to the motivation to investigate the smartphone-based AVI system. This study is aimed to provide a low-cost AVI system with high efficiency and flexibility. In this project, the object detection models, which are You Only Look Once (YOLO) model and Single Shot MultiBox Detector (SSD) model, are trained, evaluated, and integrated with the smartphone and webcam devices. The performance of the smartphone-based AVI is compared with the webcam-based AVI according to the precision and inference time in this study. Additionally, a mobile application is developed which allows users to implement real-time object detection and object detection from image storage.

Keywords : automated visual inspection, deep learning, machine vision, mobile application
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