

Application of holistic detection in industrial motion and time study

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Abstract. The integration of image processing and deep learning has become a crucial aspect of industrial development. However, its usage is still limited in the field of motion and time study. This paper introduces the development of a comprehensive holistic detection algorithm using Python and OpenCV to detect the poses of workers during operations. The detected poses from the video are transformed into variables to calculate process performance metrics such as cycle time, working speed, and compliance rating with standard operating procedures. The algorithm's performance was tested and evaluated through a series of scenarios using attribute agreement analysis theory. The statistical results showed that the proposed algorithm can provide similar motion and time study analysis as that of human observations. Thus, the proposed algorithm could help reduce the time needed for process improvement projects and promote remote work. The algorithm can also be applied in job training and detecting risky work motions to prevent accidents and injuries to workers.

Keywords. pose detection, artificial intelligence, process improvement, lean principles, industrial 4.0.

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