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Detection of Keypoint in Press-Fit Curve Based on Convolutional Neural Network

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Abstract : The quality of press-fit assembly is closely related to reliability and safety of product. The paper proposed a keypoint detection method based on convolutional neural network to improve the accuracy of keypoint detection in press-fit curve. It would provide an auxiliary basis for judging quality of press-fit assembly. The press-fit curve is a curve of press-fit force and displacement. Both force data and distance data are time-series data. Therefore, one-dimensional convolutional neural network is used to process the press-fit curve. After the obtained press-fit data is filtered, the multi-layer one-dimensional convolutional neural network is used to perform the automatic learning of press-fit curve features, and then sent to the multi-layer perceptron to finally output keypoint of the curve. We used the data of press-fit assembly equipment in the actual production process to train CNN model, and we used different data from the same equipment to evaluate the performance of detection. Compared with the existing research result, the performance of detection was significantly improved. This method can provide a reliable basis for the judgment of press-fit quality.

Keywords : keypoint detection, curve feature, convolutional neural network, press-fit assembly
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