Adaptive SVM-based Real-time Quality Assessment for Primer-Sealer Dispensing Process of Sunroof Assembly Line

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ABSTRACT

Quality assessment in many production processes typically relies on manual inspections due to a lack of reference data and an effective method to classify defects in a systematic way. Recently, the real-time, automated approach for product quality assessment has been regarded an important aspect for smart manufacturing applications, such as in the automotive industry. In this research, we develop and implement the self-evolving quality assessment system based on the adaptive support vector machine (ASVM) model in the real production system. An adaptive process is a feedback control that ensures the effectiveness of the support vector machine (SVM) algorithm over time and enables the real-time improvement of SVM-based quality assessment. Next, an industrial case study of a primer-sealer dispensing process in a sunroof assembly line of an automobile is illustrated to verify and validate the applicability and effectiveness of the proposed ASVM-based quality assessment system. Defective patterns are then analyzed using an infrared thermal image of primer-sealer dispensing in a manufacturing process, which contains multi-modal data of dimensional information and temperature deviation from the dispending patterns in our study.