

Texture-based classification of workpiece surface images using the support vector machine

ABSTRACT

Identifying the specific machining processes used to produce specific workpiece surfaces is very useful in materials inspection. Machine vision can be used to semi- or fully automate this identification process by firstly extracting features from captured workpiece images, followed by analysis using machine learning algorithms. This enables inspection to be performed more reliably with minimal human intervention. In this paper, three visual texture features are investigated to classify machined workpiece surfaces into the six machining process classes of Turning, Grinding, Horizontal Milling, Vertical Milling, Lapping, and Shaping. These are the multi-directional Gabor filtered images, intensity histogram and edge features statistics. Support Vector Machines (SVM) applying different kernel functions are investigated for best classifier performance. Results indicate that the Gabor-based SVM-linear kernel provides superior performance.

Keyword: Machined surface classification; Support vector machine; Gabor filter; Machining; Surface inspection; Computer vision