

短文

## 基于Gabor小波和核保局投影算法的表面缺陷自动识别方法

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摘要

研究了Gabor小波变换和核保局投影(Kernel locality preserving projections, KLPP)算法的原理, 分析了热轧钢板表面缺陷的特点, 提出了一种基于Gabor小波和KLPP算法的特征提取方法, 并应用于热轧钢板表面缺陷自动识别. 首先利用Gabor小波将图像分解到5个尺度8个方向的40个分量中, 接着对原始图像和各个分量的实部和虚部分别提取均值和方差, 得到一个162维的特征向量, 然后利用KLPP算法将该特征向量的维数降到21维, 最后利用多层感知器网络对样本进行分类识别. 本文提出的特征提取方法具有计算简单、可并行处理的特点, 对沿一定方向分布的边缘和纹理具有较高的区分能力. 利用从工业现场采集的缺陷图像对本文方法进行了实验, 识别率达到93.87%.

关键词 [Gabor小波](#) [核保局投影](#) [表面检测](#) [特征提取](#) [降维](#)

分类号

## Automatic Recognition Method of Surface Defects Based on Gabor Wavelet and Kernel Locality Preserving Projections

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Abstract

Principles of Gabor wavelet transform and kernel locality preserving projections (KLPP) are studied and characteristics of surface defects on hot-rolled steel plates are analyzed. A feature extraction method based on Gabor wavelet and KLPP is presented and applied to automatic recognition of hot-rolled steel plate surface defects. Surface images is decomposed into 40 complex-value components at 5 scales and 8 orientations by Gabor wavelet transform, then means and standard deviations of real parts and imaginary parts of the components and the original image are calculated as features respectively to produce a feature vector with 162 dimensions, which is then reduced to 21 dimensions by KLPP. A multi-layer perceptron classifier is constructed to classify the samples with the 21-dimensional feature vector. The feature extraction method presented in this paper has low computational complexity, high computational parallelism, and can discriminate edges and textures along different directions. The method is examined with samples of surface defects captured from a hot-rolled steel plate production line, and the classification rate is 93.87%.

Key words [Gabor wavelet](#) [kernel locality preserving projections \(KLPP\)](#) [surface detection](#) [feature extraction](#) [dimension reduction](#)

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