# 基于最小噪声分离的籽棉异性纤维高光谱图像识别

# Identification of foreign fibers of seed cotton using hyper-spectral images based on minimum noise fraction

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中文关键词：棉花 检测 图像处理 异性纤维 高光谱成像 降维 最小噪声分离

英文关键词:cotton detection image processing foreign materials hyper-spectral imaging dimensionality reduction minimum noise fraction

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中文摘要：

　　针对籽棉表层多类难检异性纤维，包括纸屑、白发、丙纶丝、化纤和地膜等5种白色物质，采用高光谱技术和最小噪声分离（minimum noise fraction, MNF）分析方法对含有异性纤维的籽棉图像进行研究。该文在400～1 000 nm的光谱范围内采集高光谱图像，根据光谱曲线选取子区域，应用最小噪声分离分析方法降维、去噪。取MNF变换后的前4幅分量图像，通过视觉评价，选定最佳成分图像并融合中值滤波、灰度变化等图像处理的方法确定最佳分割图像，提取异性纤维。试验结果表明，对于以上5种异性纤维，该方法的识别率达到91.0%。该研究可为棉花异性纤维检测系统的开发提供参考。

英文摘要：

　　Abstract: In order to improve the recognition accuracy of seed cotton foreign fibers, the identification method in hyper-spectral images based on minimum noise fraction (MNF) was proposed and applied to feature extraction to reduce the dimension of multispectral images. This method can reduce the numbers of hyper-spectral data, and made the images noise reduce to the minimum and also reduce the computational requirements for subsequent processing. This paper selected white foreign fibers and cotton, which were in small discrimination, as the research object with 512 bands in the wavelength range of 400-1 000 nm. The spectral subset was selected according to the spectral curve, and then reducing dimension and denoising by using analysis method of MNF. The best component image was selected from the first four component images of MNF transformation by manual visual evaluation. The methods of image processing including median filtering, gray change method and so on were used to determine the best image segmentation and then extract the different fibers. Experimental results show that, for more than 5 kinds of different fibers, the recognition rate of the method reached up to 91.0%.

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