Automatic Visual Inspection for Leather Manufacture

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First page example

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Automatic visual inspection for leather manufacture

Fuqiang He[1,a], Wen Wang[1,b], Zichen Chen[1,c]

[1]Institute of Advanced Manufacture Engineering, Zhejiang University, Hangzhou 310027, China

[a]hefuq@163.com, [b]wangwn@zju.edu.cn, [c]chenzc@sun.zju.edu.cn

Keywords: visual inspection; leather; defect detection; wavelet; multiresolution

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Introduction

Automated visual inspection of leather surface defects is very important in the manufacturing of leather products that require unusually high quality. These operations are currently performed by human inspectors who tend to miss considerable numbers of defects because human beings are basically inconsistent and inappropriate for such simple and repetitive tasks. Furthermore, since manual inspection is slow and labor-intensive tasks, they can become a critical bottleneck in the entire production process. In this study we use machine vision to substitute for human inspectors for automated surface inspection. Automated inspection can reduce human workloads and labor costs while increasing throughput. More importantly, higher accuracy can be achieved by eliminating human error due to fatigue.

Leather as a natural material with its variety of visual appearances – nonhomogeneous in color, thickness, brightness, wrinkledness, etc. is a complex object for control and analysis. The presence of defects is critical factor for adjustment of the leather for manufacturing of particular good, because the existence of areas with leather defects maybe considered as unusable or useful only for particular purposes. There are well known different methods for analysis of leathers surface defects and classifications [3,4]. The method is based on statistical analysis of the image gray levels. Most of algorithms to detect the leather defect by extracting a set of textural features using co-occurrence matrix approaches[2], the Fourier transform, the Gabor transform[5] and the wavelet transform[1]. These analysis methods are generally based on the extraction of textural features in the spatial and spectral domains, besides high-dimensional feature space, the most difficult task of the feature-extraction approach is to choose adequate textural features which can sufficiently represent the uniqueness of the texture in the image.

This paper present an image reconstruction approach based on the analysis and synthesis wavelet transforms to inspect leather surface defects. It does not rely on textural features to detect local anomalies, and alleviates all limitations of feature-extraction methods. With proper selection of a smooth subimage or the combination of detail subimages at different multiresolution levels for image reconstruction, the global repetitive texture pattern can be efficiently removed and only local anomalies are preserved in the restored image,

Vision system for the leather manufacture

The visual inspection systems for textured surfaces have application in different areas for analysis of defects in textile, lumber, automobile paints, etc. The application to the leather industry was