Measurement of Diameter and Scale of Cashmere Fibers by Computer Images Analysis

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Abstract

This paper mainly studies computer automatic measurement of cashmere diameter and area of cashmere fiber scales. It firstly uses Matlab7.0 to do simulation experiments to determine the appropriate image processing program that is suitable for fiber images obtained under optical microscope. The workflow of image processing includes image format conversion, image denoising, image segmentation, binarization, extraction of fiber edge and modificatory process. After image processing, it obtains the necessary binary image needed by the automatic measurement of parameters. The binary image is the basis of diameter and scale-area measurement of cashmere. This paper designs sub-measurement algorithm to achieve the automatic measurement of fiber diameter and pixel-measurement through pixel-by-point scanning to achieve the automatic measurement of area of cashmere fiber scales. It eliminates the error caused by the influence of man-made factors and improves the accuracy of the measurement, which lays the foundation of automatic identification.

Keywords: Image Processing; Cashmere Diameter; Scale Area; Automatic Measurement; Cashmere Fiber

1 Introduction

As the production of cashmere is scarce, a variety of clothing made by it is good, beautiful and elegant, so the cashmere price is expensive. In order to reap more benefits, many enterprises often blend wool and cashmere using different proportions. In order to safeguard the legitimate rights and interests of consumers, accurate and rapid identification of cashmere fiber is very important. To identify cashmere wool fiber, extracting its characteristic parameters is needed, and then identify according to characteristic parameters of the differences. In the past, artificial measurements are mostly used to extract the characteristic parameters. Such man-made factors take up relatively large and time-consuming efforts. In order to reduce the influence of human factors, computer automated measurement methods was used to extract the characteristic parameters needed. Diameter is recognized as an identification indicator, and to do such a detailed study of cashmere fiber diameter whilst realizing the computer automatic measurement of cashmere

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fiber diameter can avoid the human factor to impact the measurement results. Subsequently it provides the basis for fiber identification by fiber diameter.

2 Pre-processing of Cashmere Fiber Image

In order to achieve the computer automatic measurement of cashmere diameter, image pre-processing for cashmere fibers is needed. This paper studies cashmere fiber images collected under the optical microscope and compares it with images collected under the electron microscopy. Images of this paper contain unfavourable factors, such as the edge of the images being blurred, whilst the fiber and the background gray values do not differ greatly, and the border is fragmented, and so on. Thus, Matlab7.0 is needed to do simulation experiments to determine the appropriate image processing program that is suitable for fiber images obtained under optical microscope. After image processing, it obtains the necessary binary image need for the automatic measurement of diameter. Through simulation experiments, this paper determines the workflow of the image pre-processing shown in Fig. 1.

Fig. 2 is the original cashmere fiber image. The results of using this image processing method obtained by this paper to process Fig. 2 is shown in Fig. 3.
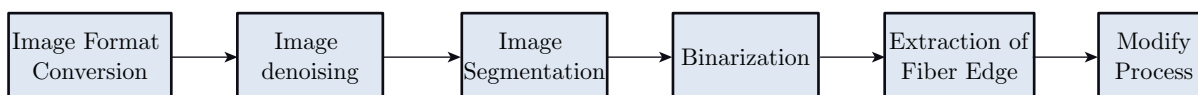

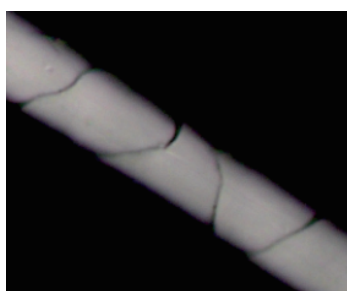Fig. 1: Workflow of image processing
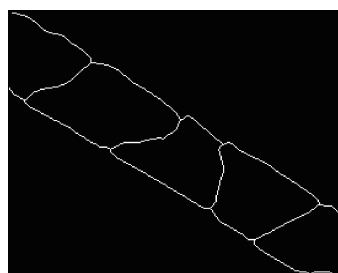

Fig. 2: Original cashmere image

Fig. 3: Image processing result

3 Measurement of Parameters of Cashmere

3.1 Measurement of Cashmere Fiber Diameter

Methods of fiber diameter measurement commonly used are area method, the main axis method, triangle law, and so on. In this paper, sub-measurement algorithm is designed to achieve the automatic measurement of fiber diameter, and this paper uses the algorithm to achieve the measurement of cashmere fiber diameter. The following section describes the basic principle of sub-measurement.