DETECTION OF UNWANTED ELEMENTS IN COTTON THROUGH HSI APPROACH

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Abstract
In a system based on an artificial vision to detect foreign fibers, there is an absolute advantage for the whole image due to the bottom of the cotton layer, but the heterogeneous fibers occupy only a small part but are brighter. Brightness and contrast images are all poor. This article presents several image processing techniques that can be used to detect contaminants in cotton fibers. Cotton contamination refers to the presence of foreign matter of cotton that affects the quality of cotton fibers. The contamination leads to a decrease in the quality of the yarn, fabric or garment, or the rejection of the entire load, even if it is a single heterogeneous fiber and, therefore, is a very important fiber parameter. Pollution has a serious and visible effect on the fabric. The quality of the cotton greatly affects its price, as determined by its color, length, strength, physical condition and most of the degree of contamination, the quality of the cotton improves, the prices increase, the position of the cotton will be good Industry in the market. In this document, foreign elements are examined from cotton. It must be done by image analysis. This has to develop a process in which the different nature of the color is shortened in those positions. Therefore, each pixel must be read through the system. If the consecutive pixels turn out to be different for each succeeding pixel, they must be read by simulation. The ultimate goal is to detect foreign fibers of cotton or foreign elements, using HSI's approach to the automation process.

Key Area: Image analysis,Histogram,Color Recognition,Edge Detection,Grid Algorithm, HSI Approach to Color.

1. Introduction:

Cotton is one of the most important raw materials in the textile industry. It is an important material for people's lives. Although Chinese textiles are cheap, their quality grades are lower and there is a big difference compared to other developed countries. Due to the heterogeneous fiber, a series of problems occurred in fiber production. First, in the manufacturing process, different fibers separate the yarn, the spinning efficiency decreases, and the production cost increases. Second, there is a possibility that the productivity of the fabric will be reduced. Especially when the fabric is dyed, there are many color defects in the fabric. It directly affects the normal order of production and exportation [1].

1.1 Image Characteristics of Foreign Fibers

To eliminate foreign cotton fibers, this requires a high demand in real time. In addition, these requirements can obviously distinguish between cotton fibers and different fibers, but also to find characteristics of images that contain small amounts of data. For the color analysis of cotton and heterogeneous fibers, the color of the image of the heterogeneous fiber is generally darker than the cotton fiber. The color of the cotton fiber is lighter than normal, but most of the color of the outer fiber is darker. For example, general heterogeneous cotton fiber as shown in Figure 1.1.

Fig.1.1 In cotton the original image of a thread

1.2: HSI (Hue Saturation Intensity)
The simple transformation dimension of the HSL and HSV geometry of the RGB model not based on perception is not directly related to the colorimetric color generation attributes of the same name defined by scientists such as CIE or ASTM. However, it is worth reviewing its definition before jumping to the derivation of our model.

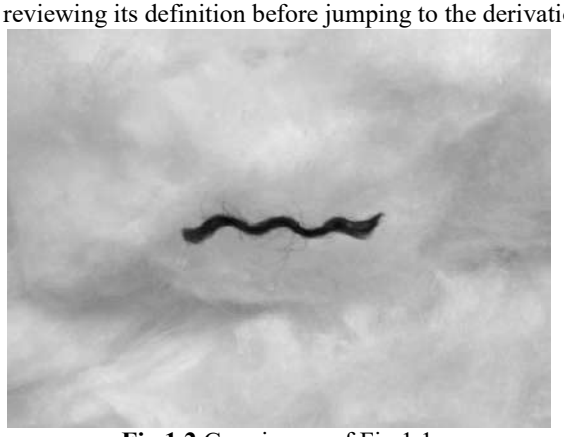

Fig.1.2 Gray image of Fig 1.1

1.3 The Image Recognition Processing Of Foreign Fibers and Detection Algorithm
The recognition of foreign fibers must satisfy the following requirements:
1. Foreign fibers in cotton must be obviously distinguished under the required resolution;
2. Can not regard too much cotton fibers as foreign fibers during recognition.

The gray scale can clearly distinguish between cotton and dissimilar fibers, the luminance information on the important features improves and the grayscale data must be significantly reduced. Therefore, the recognition algorithm is simple and the calculation speed is fast. But in the acquisition and conversion process, the foreign fiber images are easily mixed with interference and noise, the method filters should be taken to reduce the interference and the error recognition rate. To obtain statistically gray distributions of foreign textiles and cotton, it was necessary to convert the filtered grayscale into a histogram. As the basis of the histogram, an appropriate threshold division algorithm is chosen to distinguish between foreign fiber and cotton. Finally, depending on the resolution requirements of the foreign fiber, a morphological algorithm is used to eliminate the foreign fiber whose region is greater than a certain value.

2. Literature Survey
Kadir A. Peker and GökhanÖzsarı[1]suggest that cotton is a very important material to produce many textile types. It is necessary to remove contaminants from cotton from various sources before spinning the fiber into yarn. Pollutants decisively affect the quality of the yarn produced. Foreign substances can cause unacceptable yarns and fabrics, or even damage production machines. The detection and automatic elimination of fibers and heterogeneous cotton contaminants is an essential technology for the modern textile industry. Various image processing techniques and artificial vision techniques have been proposed for the detection of foreign matter in cotton fibers. Describe a detection method that uses a Gaussian mixing model and threshold processing based on pixel probability.

Ling Ouyang et.al. [2]Foreign fibers indicated that the proportion of cotton is low, but that there is a serious impact on the quality of the fiber. The heterogeneous fibers are eliminated by hand and the efficiency is low. In this thesis, establish a mathematical model based on the gray nature of the outer fiber cotton image. In addition, important features of the image are enhanced by image processing. Characters of different fibers are drawn. Finally, the Euclidean distance and the closest neighbor classification for the identification algorithm are adopted, and finally, the foreign fibers are identified.

Dongyun Wan et. al. [3]suggests that heterogeneous fiber occupies the cotton ratio, but has a serious effect on fiber quality. The heterogeneous fibers are eliminated by hand and the efficiency is low. The identification of heterogeneous fibers based on artificial vision has been proposed to satisfy the precision and requirements in real time. Since conventional identification algorithms are generally complicated and require a large number of calculations, real-time performance is poor. In this work, a mathematical model is established based on the nature of

the gray image of a line for outpatients. In addition, important features of the image are enhanced by image processing. Characters of different fibers are drawn.

Chengliang Zhang, Xianying Feng, Lei Li and Yaqing Song [4]while heterogeneous cotton fiber has a serious effect on the quality of cotton products, image processing algorithms based on artificial vision provide an effective means to treat the problem. Wavelet has been introduced to detect heterogeneous cotton fiber as an excellent possibility of signal processing and image processing. In this document, the pollutant recognition process is divided into three stages of image conversion, wavelet-based image processing, and image post-processing. In the first step, the format of the color image is converted from RGB, which is a prerequisite for the analysis of wavelet images, to an index.

JiaDongYaoand Ding Tian Huai [5]suggested that the optimal wavelength of the near infrared VIR was determined to detect a wide range of foreign cotton fibers. We also developed an optimal wavelength image system using image processing algorithms. The results of the research showed that this method is effective for the detection of heterogeneous fiber that is difficult to classify at present.

Chen Yajun, Zhang Erhu and Kang Xiaobing [6]presented a gas-solid biphasic flow velocity measurement method based on a double linear CCD camera and a cross-image correlation algorithm, and a heterogeneous cotton fiber extraction system. First, the principle of estimating the gas-liquid two-phase flow velocity using a double linear CCD camera will be explained. Next, we investigated the incorrect problem of cotton flow velocity measurement using the ultrasonic wind speed sensor and discussed the cotton flow rate measurement method of the dual CCD camera as a function of the structure of the system detection. Finally, we will describe in detail the method to measure the speed of cotton flow at high speed based on the cross-correlation algorithm of the image. The results demonstrated the validity of the proposed method, with this method that accurately estimates the flow rate of cotton in different sub regions, decreasing the amount of cotton that falls per balloon.

Zhang Qing et. al. [7]Fiber out of fiber-fiber designs an online detection system that uses a CCD vision sensor, detects and eliminates heterogeneous raw cotton fibers before opening the cotton, and manufactures a model machine. By experimental verification, the model machine works well and the detection rate of small foreign fibers exceeds 90%.

TingtingXieet. al. [8]in addition, in order to detect foreign objects from the bottom of the complex channel and the cotton layer, this document proposes a detection method based on the RGB space model. We extracted the standard characteristics of cotton and the bottom of the canal and created a spatial model of cotton. This model was then used to process the true 24-bit color image captured from the strange particle classifier. The results of the simulation show that in a real work environment, foreign matter can be effectively detected by overcoming the interference caused by the complicated channel background and the diversity of the foreign fiber.

3.Proposed Work

3.1 Objective: To detect the foreign fiber or elements in cotton using the HSI Approach for automatization process.

3.2 Proposed Methodology: This thesis investigates the foreign elements from cotton. It has to carry out through the image analysis. This thesis has to develop the process by which the different nature of color has been short out with their position. So each pixel has to be read out through system. If the consecutive pixel find different by their successive pixel then it must be read out by simulation.

3.3 Proposed Technique: HSI Color detection using Grid Detection algorithm has been simulated through MATLAB.

3.3.1 Grid Detection Algorithm

The grid is a common and useful way to organize data. This data format represents the value or intensity at the position of a discrete grid point. The detection of grids is a proposed methodology, which is an integrated form of co-structured pixel formats with edge detection. The cooperative form is a representation of similar information units taken in common sense. It is very similar to a cluster with values close to the group.

3.3.2 Steps:

1: Collect the test pictures that are coming out by production line.

2: Save all pictures in a separate folder.
3: Make a clear picture that containing the no foreign elements as a pictures of foreign elements or undesired elements
4: Make both of them as a template file and save it in mat files format,
5: Compare the test file with the template file and find the similarities.
6: then highlight the suspected portion within the test pics and note down the simulation time.
7: test the same for at least 20 pics and note the time of simulation and find the average.

3.4 Tools

MATLAB 2013

This tool will provide the best realistic scenario to proposed work as well easy to formulate the mathematical expression to executable code.MATLAB is a multi-paradigm numerical computing environment. A proprietary programming language developed by Math Works, MATLAB allows matrix manipulations, plotting of functions and data, implementation.

3.5 Mathematical algorithm

Foreign Fiber Detection Methods

3.5.1. Image Segmentation Algorithm Based on Fast Wavelet Transform

In the original image, cotton can be treated as background, while foreign fibers are expressed as foreground. Consequently, edge detection is a feasible way to our problem. When digital images are to be viewed or processed at multiple resolutions, the discrete wavelet transform (DWT) is the mathematical tool of choice. In this paper, the fast wavelet transform (FWT) is adopted to achieve the edge feature extraction. It is defined as

$$\varphi(x) = \sum_n h_\varphi(n)\sqrt{2}\varphi(2x-n),$$
$$\psi(x) = \sum_n h_\psi(n)\sqrt{2}\varphi(2x-n),$$

Where, h_φ and h_ψ the expansion coefficients are called scaling and wavelet vectors, respectively. They are the filter coefficients of the FWT, an iterative computational approach to the DWT shown in Figure below.

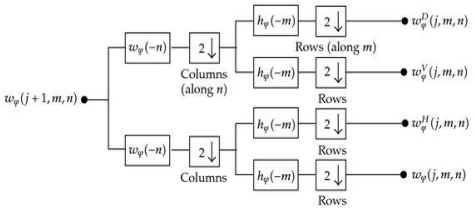

Figure: 4.1 the 2D fast wavelet transform (FWT) filter bank. Each pass generates one DWT scale. In the first iteration, wφ(j+1,m,n)=f(x,y).

3.5.2 Colour Model Conversions

Conversion between RGB and HSV

The **HSV** colour model can be considered as a different view of the **RGB** cube. Hence the values of **HSV** can be considered as a transformation from **RGB** using geometric methods.The diagonal of the **RGB** cube from black (the origin) to white corresponds to the **V** axis of the hexcone in the **HSV** model.

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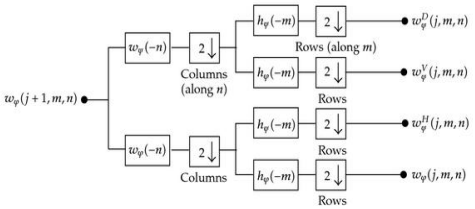

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4. Conclusion & Future Scope

The proposed technique finds the most precise solution to find heterogeneous fibers present in cotton through more than 20 cotton with undesirable elements. As this result is shown in the image, you can conclude in summary form and find a stochastic accuracy analysis through the number of MATLAB Simulation test images. Currently, there is a wide variety of grid methods available, but the speed and accuracy of the algorithm is an important factor for online visual inspection systems. Therefore, in addition to ensuring the accuracy of segmentation, the fastest algorithms are more attractive. Therefore, in many cases, the foreign fiber detection method is not suitable for using the grid algorithm. However, ultraviolet light can color heterogeneous PE or PP plastic fibers, and in these circumstances, color images are very useful and necessary. It is well established that the human perception of color similarity is not modeled by the grid algorithm. Future research will advance more in the research on the segmentation of color.

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