Location of Defects in Fabrics Using Feature Extraction Technique

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ABSTRACT: This paper presents an approach to locate the defects in fabrics digital image processing. Fabric defect detection has been carried out manually with visual inspection for a long time. In the manual fault detection system very less percentage of the defects are been detected while a real time automatic system can increase this to a maximum number. Fabric analysis is performed on the basis of digital images of the fabric. The recognizer acquires digital fabric images by image acquisition device and converts the image into binary image by restoration and threshold techniques. To upgrade this process the fabrics when processed in textiles the fault present on the fabrics can be identified using feature extraction techniques with MATALB. This image processing technique is done using MATLAB. This research thus implements a textile defect detector with system vision methodology in image processing.

Keywords: Image processing, MATLAB, , Histogram, Thresholding, graph based segmentation, feature extraction.

INTRODUCTION:

The textile industry, as with any industry today, is very concerned with quality. It is desirable to produce the highest quality goods in the shortest amount of time possible. Fabric faults or defects are responsible for nearly 85% of the defects found by the garment industry. Manufacturers recover only 45 to 65 % of their profits from seconds or off-quality goods. It is imperative, therefore, to detect, to identify, and to prevent these defects from reoccurring. Here it can analyze all faults present on fabrics such as hole, scratch, dirt spot, fly, crack point, color bleeding etc. automatically. Hence the efficiency is also reduced in this process. To overcome all these drawbacks this automation process can be implemented. Fabric defect detection is an important part of quality control in the textile industry. They have to detect small detail that can be located in wide area that is moving through their visual field by feature extraction technique in Matlab.

RELATED WORKS RELATED WORKS:

Fabric defect detection using digital image processing has received considerable attention during the past two decades and numerous approaches have been proposed in the literature. Navneet Kaur [1] proposed a Gabor flter scheme. A Gabor filter was chosen as a suitable representative of this class of techniques. This research then successfully applied optimized 2-D Gabor filters to the textile flaw detection problem and provided a further support of their suitability for this task. By Kang T.J. et al. [9],A novel optimized 2-D Gabor algorithm presented in this study is an automatic solution which is adaptable to detect a large variety of textile flaw types, both structural and tonal. S.Priya [4] has separating a digital image into its bit planes is useful for analyzing the relative importance played by each bit of the image. Instead of highlighting gray level images, highlighting the contribution made to total image appearance by specific bits is examined. Most of the algorithms used today for fabric defect localization.

DEFECTS CLASSIFICATION:

In textile sectors, different types of faults are available i.e. hole, scratch, stretch, fly yarn, dirty spot, knot, slub, cracked point, misprints, color bleeding etc; if not detected properly these faults can affect the production process massively. Proposed textile analysis mainly detects four types of faults: hole, scratch, fresh as no fault and remaining faults as other fault. Inspection of 100% of fabric is necessary first to determine the quality and second to detect any disturbance in the weaving process to prevent defects from reoccurring.

Yarn Defects

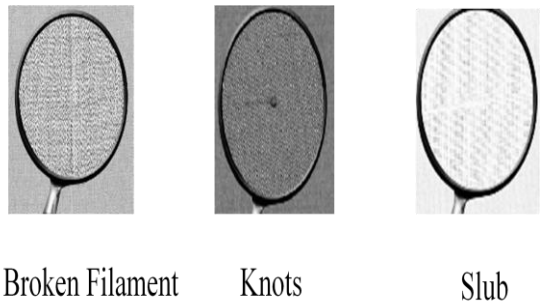


Fig.1

Weaving Defects

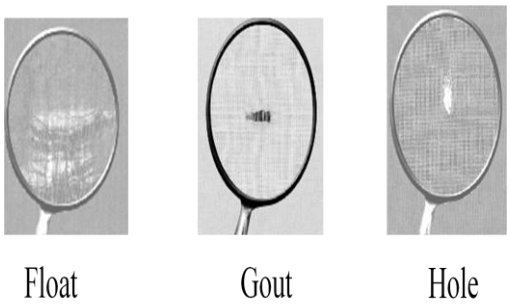


Fig.2

METHODOLOGY:

The digital analysis of two-dimensional images of fabric is based on processing the image acquirement, with the use of a computer. The image is described by a two-dimensional matrix of real or imaginary numbers presented by a definite number of bytes. The system of digital image processing may be presented schematically as shown in Figure below

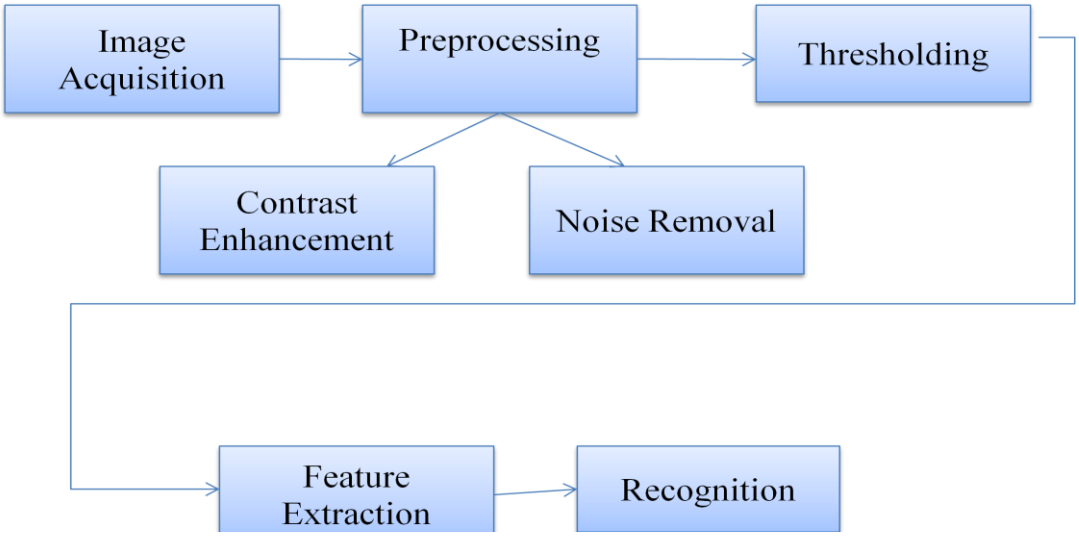


Fig.3

The method used in this paper is processed using MATLAB with image processing toolbox. The toolbox supports a wide range of image processing operations, including: open image file, add noise to intensity image, 2-D median filtering and adaptive filtering, Image analysis and enhancement, Color Image decomposition into RGB Channels, Image histogram, Image segmentation, signal plotting and etc.The given Algorithm shows the general flow of the Various Modules of Matlab Software:Textile fabric surface image is acquired by using a CCD camera from top of the surface from a distance adjusted so as to get the best possible view of the surface.

A. Image acquisition: Acquire Input color fabric image to the MATLAB in image processing system. The image formats are .tif, .Jpeg, and .png. In this paper we used color images (RGB images) and separated into their components (Red, Green, and Blue).

B. Contrast Enhancement: The Image Processing Toolbox contains several image enhancement routines.

- **Step 1: Load Images**

Read an images: fabric.jpg and detect.jpg.

- **Step 2: Resize Images**

To make the image comparison easier, resize the images to have the same width & hight.

- **Step 3: Enhance Grayscale Images**

Histogram Equalization is Applied to Enhance the Contrast of Fabric Surface.

Color Image is Converted To Gray Scale Image

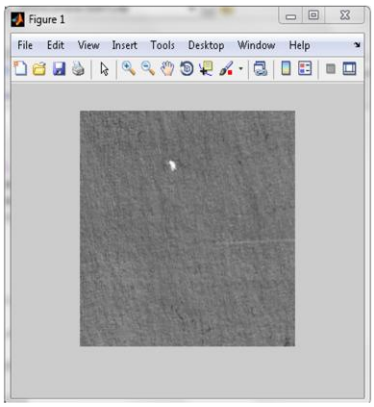


Fig.4

Histogram Equalization:

- Histogram is a representation of the distribution of color in an image and it represents the number of pixels that have colors in each of a fixed list of color ranges.
- Histogram equalization is a method for stretching the contrast by uniformly distribution the gray values enhances the quality of an image.
- It enhances the contrast of images by transforming the values in an intensity image.

The contrast enhancement can be limited in order to avoid amplifying the noise which might be present in the image.

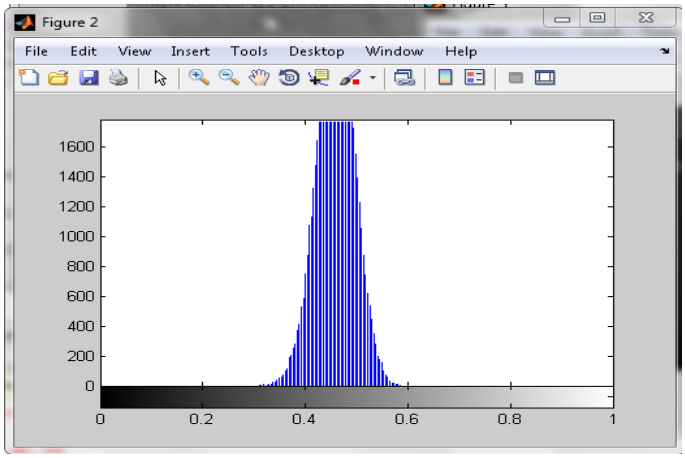


Fig.5

C. Noise Removal : Whenever an image is converted from one form to another many types of noise can be present in the image. Noise is random variation of brightness or color information in images. The Wiener filtering method is used to filter the noise present in the image.Wiener2 low pass filters an intensity image that has been degraded by constant power additive noise.It uses pixel wise adaptive method based on statistics estimated from a local neighborhood of each pixel.

D. Image segmentation: Image segmentation is the process of partitioning a digital image into multiple segments. Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images. The result of image segmentation is a set of segments that collectively cover the entire image, or a set of contours extracted from the image (edge

detection). Each of the pixels in a region are similar with respect to some characteristic or computed property, such as color, intensity or texture.

E. As binary images are easy to operate, other storage format images are often converted into binary images are used for enhancement or edge detection. All images can be neatly segmented into foreground and background using simple thresholding. The purpose of thresholding is to extract those pixels from some image which represent an object (such as graphs, maps). This way can be determined by looking at an intensity histogram of the image.

Thresholding are two types :

- Global Thresholding
- Local Thresholding

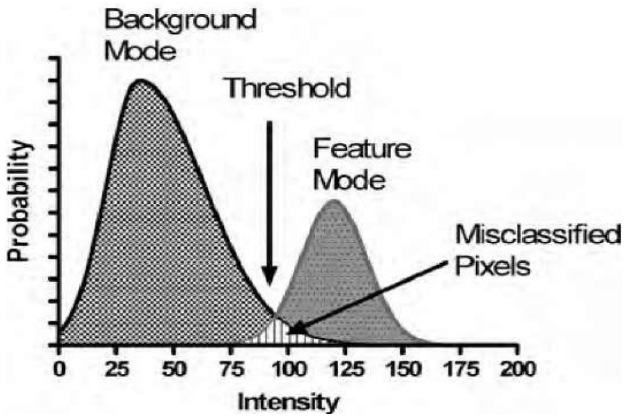


Fig.6

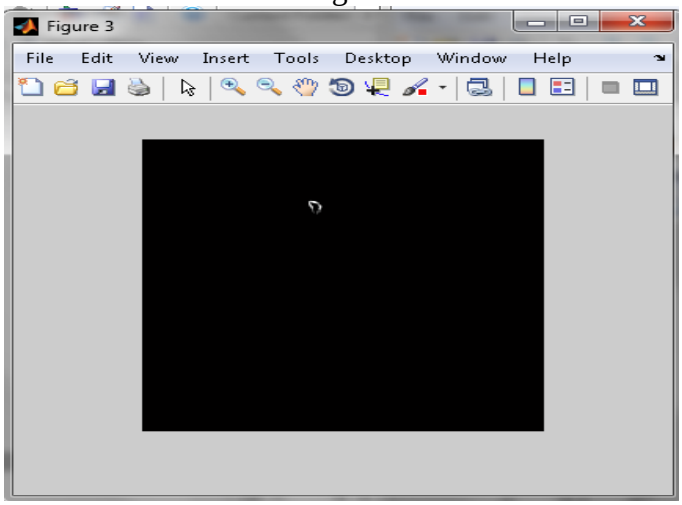


Fig7.

A. Graph based segmentation : The next step is to use the regions extracted by preprocessing and to extract segments that correspond to the defects. The general concept of graph based methods and measures the evidence of a boundary between two regions by computing :

(a) Intensity differences across the boundary and

(b) Intensity differences between neighboring pixels within each region.

This is mainly due to the use of the local thresholding method that performs well even when there is no uniform background in the images. The graph based segmentation returned each of the detected objects as a different segment colored randomly. The detected segments outside the image and the ones with an area greater or smaller than a minimum (50 pixels) and maximum area (3500 pixels), correspondingly.

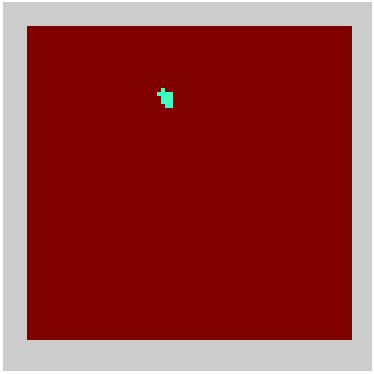


Fig.8

F. Feature extraction: When the input data to an algorithm is too large to be processed and it is suspected to be notoriously redundant then the input data will be transformed into a reduced representation set of features (also named features vector). Transforming the input data into the set of features is called feature extraction. Feature extraction has two major point for extraction:

- Feature Selection
- Feature Definition

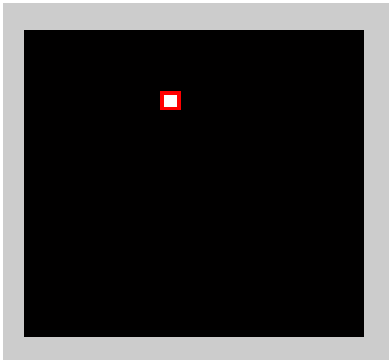


Fig.9

Feature Definition: Several types of features are used , the simplest are the geometric features ,intensity features & moment based feature. The users use both geometrical and intensity based attributes to evaluate a segment in fabric images. Geometric features, like form factor, rectangularity factor, location and orientation are used. Intensity features, that are commonly

used to find average and the standard deviation of the intensity values. Moment-based features, which provide information about shape and intensity at the same time.

Feature selection: Feature requires a lot of computational power especially the texture based ones. Feature provide the useful information and reject the rest. Feature section refers to a method that selects a subset of original feature based on a evaluation orientation. Feature extraction is general term for method of constructing get combination of the variable to around this problem while still describing the data with sufficient accuracy.

Experiment Result

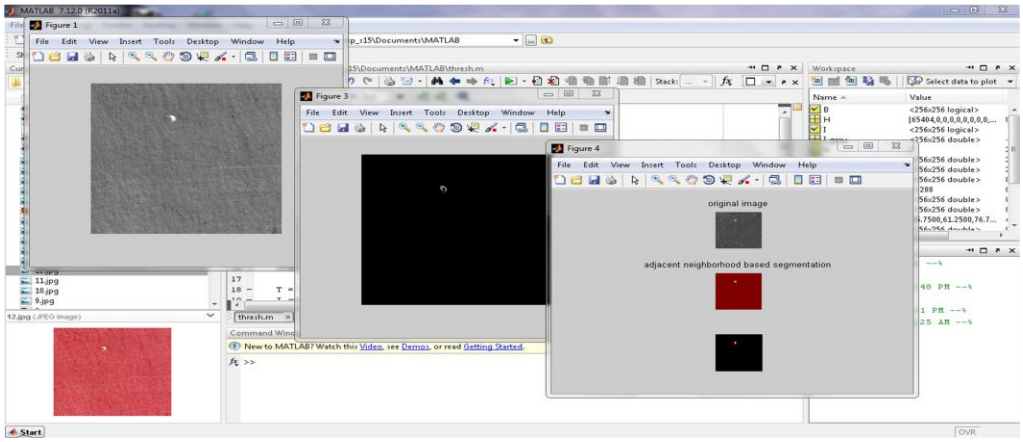
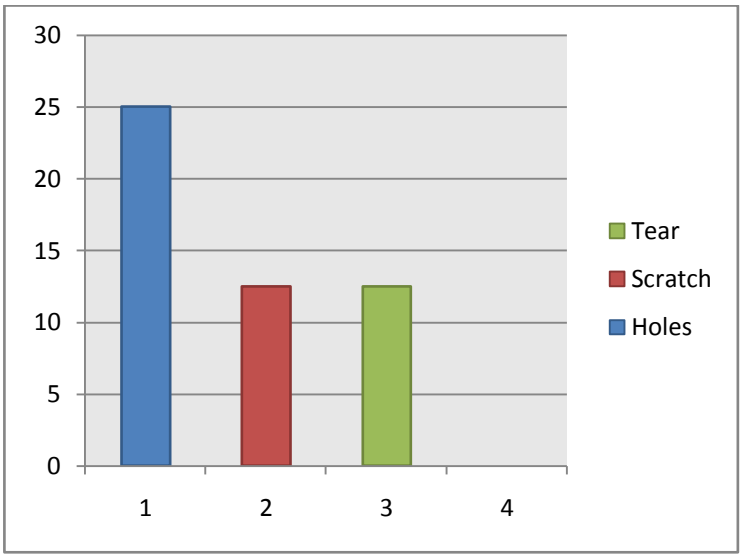


Fig.8

Bar Chart of Defect Loaction



CONCLUSION :

The fabric defect detection in the normal fabrics defines the faults by this feature extraction method. Fabrics using both geometric and texture features to capture the visual properties. For preprocessing it used local thresholding followed by graph based segmentation . one of the most important advantage of the methods that ,it is multipurpose without requiring any adjustment. For given method allows finding the better accuracy and consuming the time in Industry.

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