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DETECT THE FABRIC DEFECT AREA USING EDGE DETECTION TECHNIQUES

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Abstract:
In Textile industry automatic fabric inspection is important to maintain the quality of fabric. Fabric defect detection is carried out manually with human visual inspection for a long time. The work of inspectors is very tedious and consumes time and cost. To reduce the wastage of time and cost automatic fabric defect detection is required. This paper proposes an automotive approach to recognize fabric defects in textile industry for minimizing production cost and time.
Fabric analysis is performed on the basis of digital images of the fabric. The recognizer acquires digital fabric images by image acquisition device, image is converts the image into gray scale image, and applying various edge detection techniques, finally detected the fabric infected area and measure the quality of the image by using GLCM(Gray level co-occurrence matrix).

Key Words: Defect Detection, Image Processing & Edge Detection

1. Introduction:

In this paper, we discuss about to detect the region of fabric defect by using digital image processing techniques. 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. Identifying defects in fabric is a major concern for fabric industries as it is important for their brand images for quality products. Automated visual inspection system to detect possible defects in fabric provides a more reliable and consistent quality control process than human eye view. There is a growing need for automated fabric defect inspection system in the textile industry. The fabric inspection may be achieved in shorter time and with higher performance by using an automatic fabric inspection system. The fabric defects can be evaluated objectively and presented statistically. The fabric defect area is identified by using Digital Image Processing Techniques. The edge detection technique refers to the process of identifying and locating and locating sharp discontinuities in an image. The discontinuities are abrupt changes in pixel intensity which characterize boundaries of objects in a scene. The various edge detection techniques are applied, such as canny, prewitt, sobel and Robert. Finally to detect the fabric area through applied various edge detection techniques.

2. Literature Survey:

Fabric defect detection using digital image processing has received considerable attendion during the past two decades and numerous approaches have been proposed in the literature. H Ibrahim celik, L Canan Dulger and Mehmet Topalbekiroglu proposed a linear filtering and morphological operations. He also discussed about the five types of defects. The defective fabric samples are then classified by using feed forward neural network method. Debosmitt Ray discuss about the feature extraction and pattern recognition. The main aim is to detect the image using canny edge detection and sobal edge detection. Md .Tarek Habib, Rahat Hossain Faisal M. Rokonuzzaman, Farruk Ahmed proposed the surverys of classifiers are statistical Inference, Support vector machine, artificial neural networks. The varies classifiers are used to detect the fabric. Finally compared the classifiers based on three performance matrices such as accuracy, model complexity and training time. Raman Maini, Dr. Himanshu Aggarwal detect the image using edge detection techniques. Classical methods of edge detection involve convolving the image with an operator(a 2-D filter).Operators used on noisy images are typically larger in scope,so they can average enough data to discount localized noisy pixels.the main objective is to compare the various edge detection techinues and analyze the performance of the various techniques. Jagrti patel, Meghna Jain and Papiya Dutta speak about the detection of faults in acquires digital fabric images by using different defects classifications they are Yarn defects, Weaving defects. Problem of manual fabric defect inspection are lack of accuracy and high time consumption, where early and accurate fabric defect detection is a significant phase of quality control. Computer vision based that is automated fabric defect inspection system are thought by many researchers of be resolved to attain a successful automated fabric defect inspection system. In this work, we discuss different techniques used for automated fabric defect detection and finally detect the fabric area through applied various edge detection techniques.

3. Methodology of Proposed Work:

In this paper we analyze the faults using image processing technique. Image processing Techniques will help to production increase in fabric industry, it will also increase the quality of product. The digital image processing is used for the capture of input images. An automatic fabric evaluation system has been developed to automatically analyze the defected area of the fabric. The system of digital image processing may be presented schematically as shown in fig below.

The Process of the Proposed Work Consist:

Step1: Textile Fabric defect is acquired by using a CCD Camera and this image is taken as input image.
Step 2: Gray Image conversion- RGB colour images is convert into grayimage. A Gray Scale image usually requires that each pixel be stored as a value between 0-255(byte), where the value represents the shade of the pixel.
Step 3: Noise removal - applied the mean filter to the gray image the mean fitter is used to remove the noise in the fabric defect image.

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Step 4: Apply Various Edge detection Techniques- the edge detection is a process of locating an edge of an image. It used to understanding image features, the images are divided into areas corresponding to different objects. The techniques are such as Canny, Sobel, Prewitt, and Roberts.

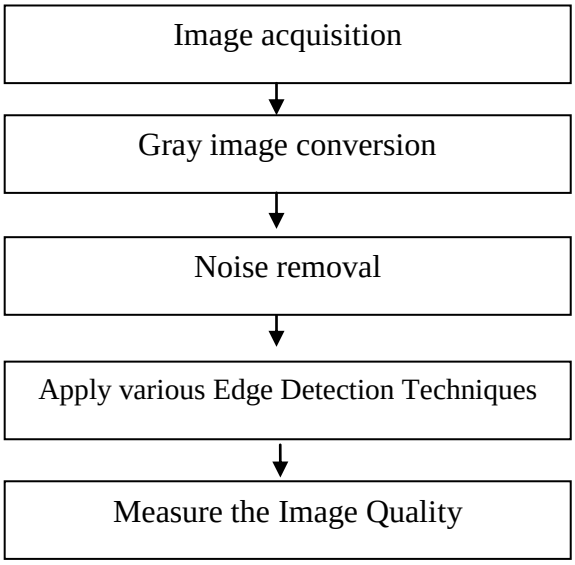


Figure 1: The Process of Proposed Work

Canny Edge Detection: Canny edge detection is a technique to extract useful structural information from different vision objects and dramatically reduce the amount of data to be processed. It has been widely applied in various computer vision systems.

Prewitt: The Prewitt is used in image processing, particularly within edge detection algorithms. Technically, it is a discrete differentiation operator, computing an approximation of the gradient of the image intensity function.

Sobel: Sobel edge detection is a techniques to extract the image from different objects.

Step 5: Measure the Image Quality by using GLCM. The properties of glcm contain contrast and homogeneity.

Contrast: Returns a measure of the intensity contrast between a pixel and its neighbor over the whole image.

Range = [0 (size (GLCM, 1)-1)^2]

Contrast is 0 for a constant image. Contrast is also known as variance and inertia.

Homogeneity: Returns a value that measures the closeness of the distribution of elements in the GLCM to the GLCM diagonal.

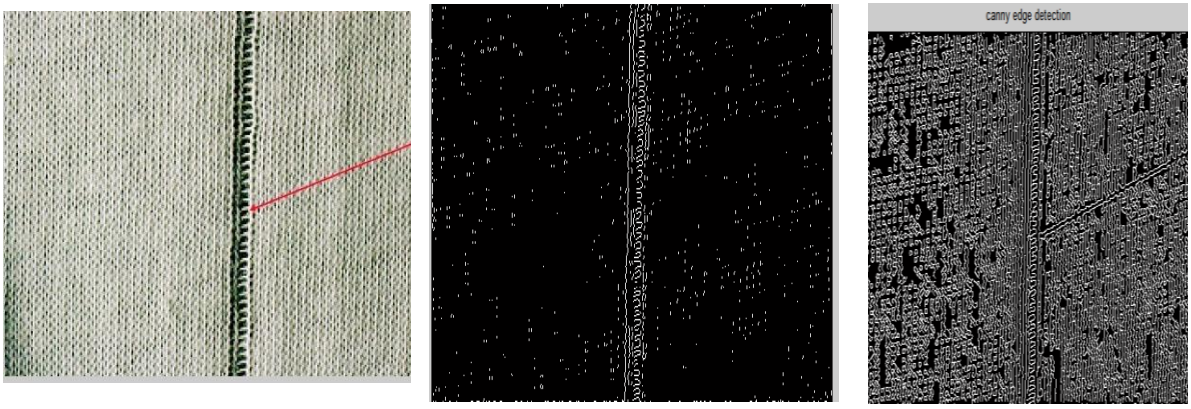
Range = [0 1]

Homogeneity is 1 for a diagonal GLCM.

4. Results and Discussion:

Textile Fabric defect image

To Applied Various Edge Detection Techniques for Fabric Defect Image



Original Image | Applied Mean Filter to the Image | Applied Canny Edge Detection Technique

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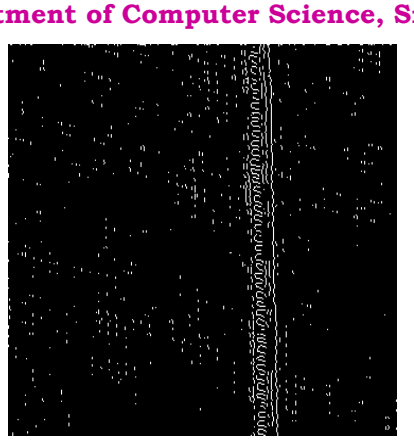
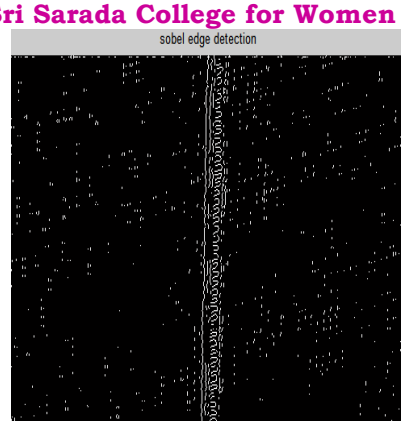
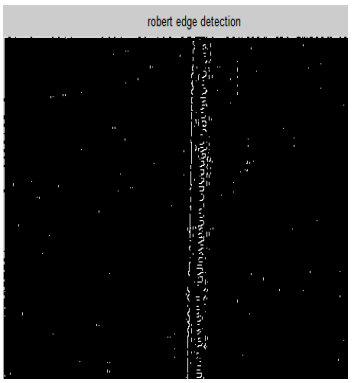


Applied Prewitt Edge Detection Technique



Applied Sobel Edge Detection Technique



Applied Robert Edge Detection Technique

Figure 2: applied various edge detection techniques for fabric defect image

Edge Detection Techniques	Homogeneity	Contrast
Prewitt	0.3914655	0.983893
Roberts	0.857072	0.792146
Canny	0.4826772	0.823009
Sobel	0.0323337	0.838339

Table 1: Measure the image quality by using contrast and homogeneity value

Table 1 shows the detail of prewitt, Roberts, Canny, Sobel is used to measure the image quality by contrast and homogeneity value. By using Robert edge detection the homogeneity and contrast value is high compare to other edge detection techniques. Figure 3 shows the homogenity and contrast values are illustrate.

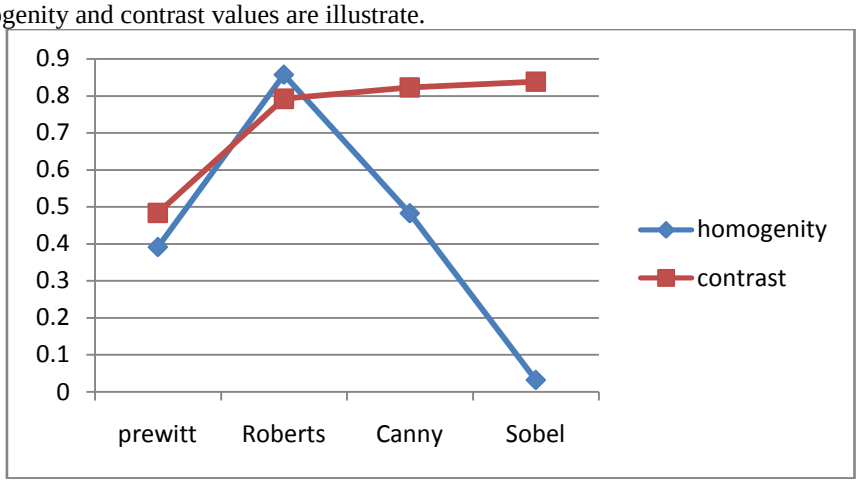


Figure 3: The Homogeneity and Contrast Value of All Edge Detection Techniques

5. Conclusion:

An automatic detection of the fabric defect area by using various edge detection techniques are such as Canny, Sobel, prewitt, and Roberts. In this paper we applied Mean filter it used to remove the unwanted noises in the fabric image. Then applied various edge detection techniques used to identify the fabric defect area. Finally measure the quality of the image by using contrast and homogeneity values. The Roberts edge detection techniques given a best image quality value compare to other techniques.

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