Fabric Defect Detection Using Image Processing Techniques

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Abstract— A defect in the fabric hinders the quality of the fabric to a greater extent. These defect in the fabric are predetermined to occur no matter what type of production methods are used. Majority of defect detection is carried out by physical inspection by labor, but these type of inspection fails to comply with the detection of minute defects which are undistinguishable by a human eye. Using modern technology we can implement automation in detecting these defects which may be otherwise unseen or not detected. The automation system will identify the defect based on the appearance of the fabric and will optimally produce the solution. These use of modern technique will enhance the quality of product and will meet the expectation of customer demands and will reduce the cost depreciation.

Key words: Algorithm, Image Processing, Fabric Defect Detection (FDD), Fabric, Patterns

I. INTRODUCTION

The fabrics that are processed in textile industries are produce on large scale with a continuous process. The detection of defects visually becomes very hard to keep up with the production. Hence by implementing an automation process to identify the defects will minimize the inspection time and error. The monitoring of fabric will be precise and will minimize the quantity of poor quality fabric.

The image processing technology will be used to detect the defect in the fabric. The image of the fabric will be captured and the various algorithms will be implemented to recognize the fault in the fabric. The image processing technique will categorized the fabric according to their pattern and design. There may be some shadow or crease on the fabric which will be detected an ignored as those are not the defected parts. The image of the fabric captured may have uncertain lighting conditions which will change the visual appearance of the fabric, but we will use HSV color processing to find the true color of the fabric.

II. ALGORITHM SUMMARY

The algorithms will be focused on differentiating the faulted fabric from the good fabric. Hence the image processing algorithm will enhance the captured image by reducing the noise using blur algorithm. The image will be compared using grayscale and HSV conversion algorithm to remove any adulterated pixels. These algorithms will work on both plane and design pattern fabrics. The threshold algorithm will differentiate the background and foreground of the image depending on the threshold value.

III. WORKING

The setup consist of a camera mounted on a stand under which the fabric will be presented. The first step will be training phase in which the good quality fabric will be saved in the database. The saved image will be processed for its characteristic pattern. The second phase is detection phase, in this phase the raw fabric produced will be given as input feed to the assembly. The images of input fabric will be captured and processed by comparing it with the good quality fabric that was trained in the beginning. If any defect is present in the fabric the software will detect and localized the fault. After the fault has been detected the post processing will take place. The post processing will depend on the user to take the necessary action.

IV. FLOW OF ALGORITHM

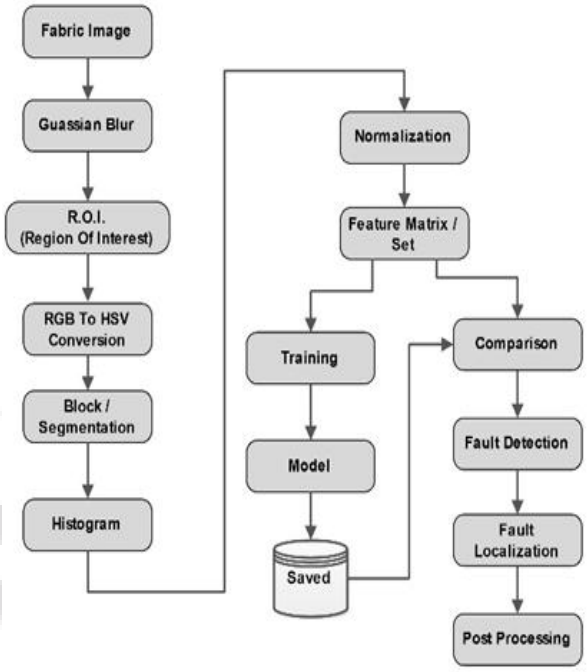

Fig. 1: Flow Diagram

When the fabric image is capture the image processing algorithm works in the following way:-

A. Blur:

The image is blurred in order to remove the noise from it. The noises are the pixels that show incorrect value of RGB.

B. Gray Scale:

The image is processed into gray scale so as to equate the value of every pixel into its average value.

C. Threshold:

The threshold is used to separate the foreground with the background.

D. RGB to HSV:

Converting the pixels from RGB to HSV gives us true value of the color. The image consists of dark and bright part from shadows which changes the shade of color. Hence to unify the color we covert it into HSV color system.

E. HSV Threshold:

The HSV threshold will be used to identify the different color pattern in the fabric. The different color blocks will be separated by using HSV threshold algorithm.

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F. Blob Detection:

If there exists any unusual blob present in the image this algorithm will detect and locate the part and mark out the area where blob is detected.

V. DESIGN AND IMPLEMENTATION

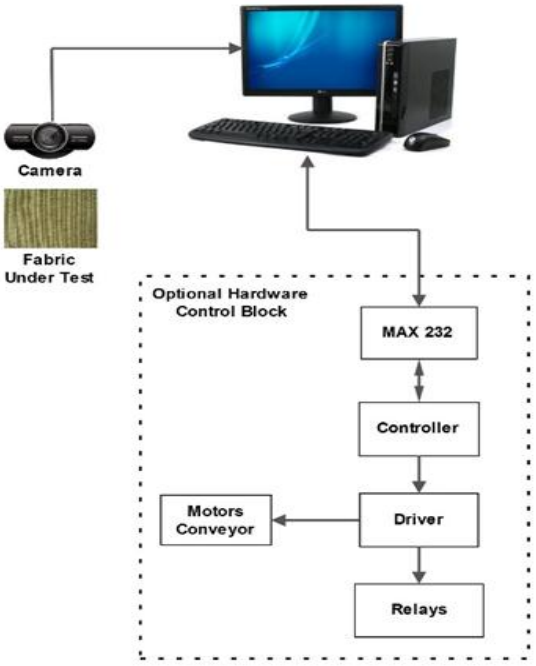

Fig. 2: Hardware Implementation

Hardware Implementation – The hardware will be implemented for continuous detection of fault in the fabric. It will have a conveyor belt on which the fabric will be loaded. Once the fabric is loaded the conveyor belt will position the fabric below the camera which is mounted on the top. The camera will capture the image of the fabric underlying. This image will be processed and the first image will be the model image of good fabric. The onward input of fabric will be inspected for the defects. If any defect is detected the conveyor belt will stop and locate the defected part on the screen monitor. The user may choose the option to remove or continue with the detection. This process will continue till the end of fabric inspection.

VI. SOFTWARE SIMULATION

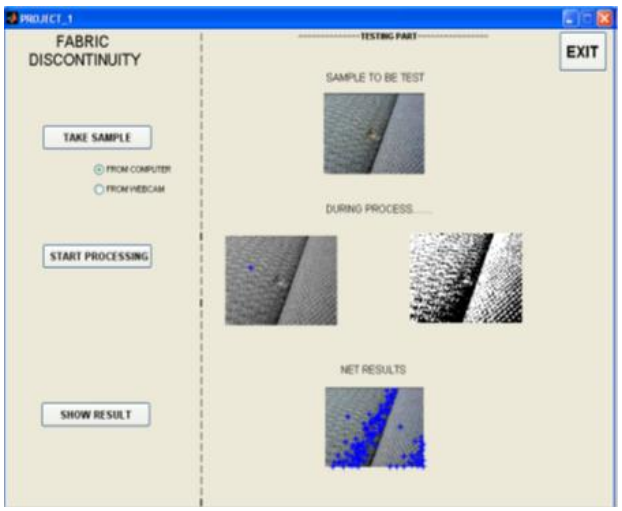

Fig. 3: Result Window

Fig. 4: Result Window

VII. CONCLUSION

This paper represents a low cost and portable system that makes automation technology reach to all type of fabric manufacturer. This system will be able to address the problem such as low efficiency, lethargy and high error rate. As this system is simple but very efficient the setup can be installed on any place and the testing may start as soon as possible.

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