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Survey on Fabric Fault Detection System

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ABSTRACT*:* In recent years most of the textile industries are automated. The manual and automated processes involves sewing, knitting and dyeing units. Manually detecting fabric fault by a human is a tedious task. The accuracy rate depends upon the human operator's skill and varies from person to person. The main objective of this project is to detect faults in fabric using computer vision and the histograms of reference image and test image are compared and error is calculated. On the basis of output it is decided such that on identifying a fault i.e. when the error exceeds the maximum permissible value, it is displayed on the screen and the motor of the machinery is turned off. Faults like scratch, whole, dirt, spot, y, crack-point and colour bleeding can be identified automatically. This method eliminates human inspection and increases accuracy, thereby increasing productivity in textile industries. The method used in this project is template matching and the library used for it is OpenCV.[1]

KEYWORDS*:* FFT- Fast Fourier Transform, DIP-Document Image Processing

I. INTRODUCTION

Fabric Fault Detection System (FFDS) system is an attractive alternative to human vision inspection. Based on advances in computer technology, image processing and pattern recognition, FFDS system can provide reliable, objective and stable performance on fabric defects inspection. An automated system which gives lower labour cost and shorter production time can be called as a good automated system. In past two decades numerous reported works are there during which computer vision based inspection has been applied. The reason is that fabric is one of the necessities which humans rely on extensively; clothing, blankets, and bandages are all made of fabric. Since there is a tremendous amount of demand in fabric, the textile industry flourishes as to satisfy the demand through textile manufacturing. Hence, it is crucial to implement a defect detection system to monitor the quality of fabric in the production lines. Furthermore, the defect detection system can be served as an alert mechanism to prevent further loss of weaving materials for a textile factory. Traditionally, the defect detection system is done by using human eyes, where fabrics are placed on an inspection table and examined by inspectors. However, the accuracy of human inspection is unstable due to fatigue, and it is more challenging for human eyes to detect fine defects. Therefore, automated inspection becomes a popular way for substituting human inspection, as machines are good at repeating a same task without fatigue. Until now, most automated inspection machines are realized by using visual inspection systems.

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II.RELATED WORK

1.Fabric Fault Detection using Traditional Method.

In this method to detect the fault fabric manually. By a human visual in traditional task. The method can required man power the accuracy depends upon the skill of human operator and the various from person to person. This process is slow process because one person can stand and check each and every cloth and detected the fault. This method not required the high educated person. The learning cost is zero because hole process is depend on human skill. Lot of time will be consumed by this process

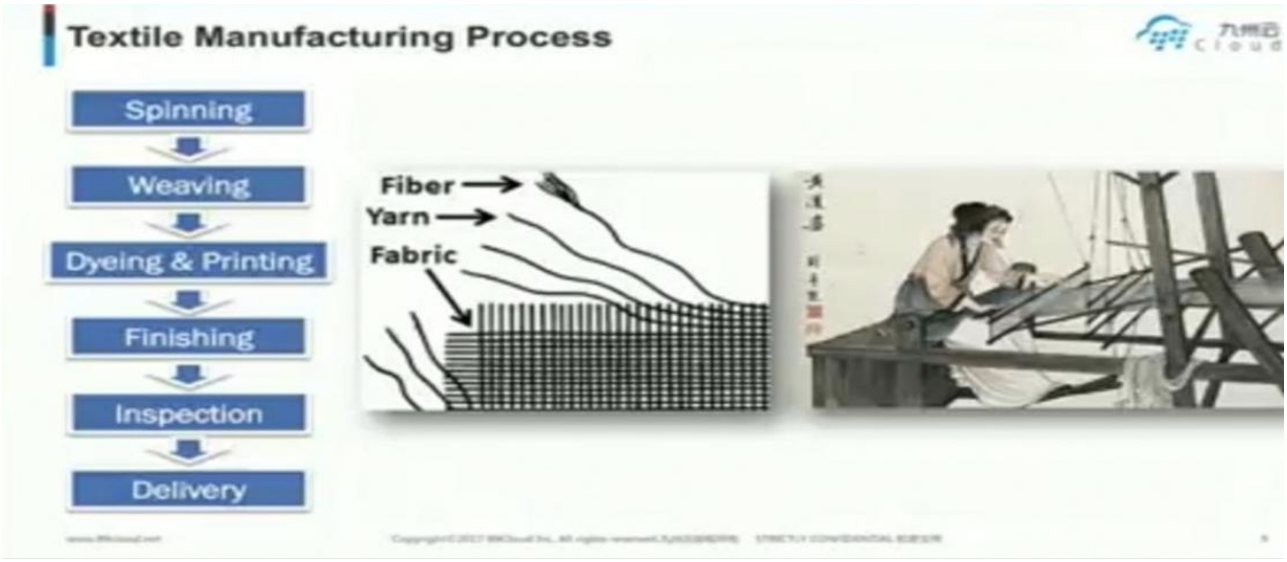

Fig.1: System architecture of Fabric Fault Detection using Traditional Method

2.DIP Based Automatic Fabric Fault Detection.

In today's era production rate improvement is necessary. Fabric inspection has an importance to prevent to risk delivering inferior quality product. DIP means Document Image Processing, a system for the digital storage and retrieval of documents as scanned image. It is capable of identifying all defects. Because every fabric which is free from defect has a periodic regular structure, if a defect occurs then it breaks fabrics regular structure. Hence, for detecting the fabric defects fabric structure is monitored. In this work, Fast Fourier Transform (FFT) and Cross-correlation techniques, i.e. the linear operations are first implemented to examine the structure regularity features of the fabric image in the frequency domain. Level selection filter is implemented to improve the efficiency of the technique and overcome the problem of detection errors, this is a thresholding operation.[2]

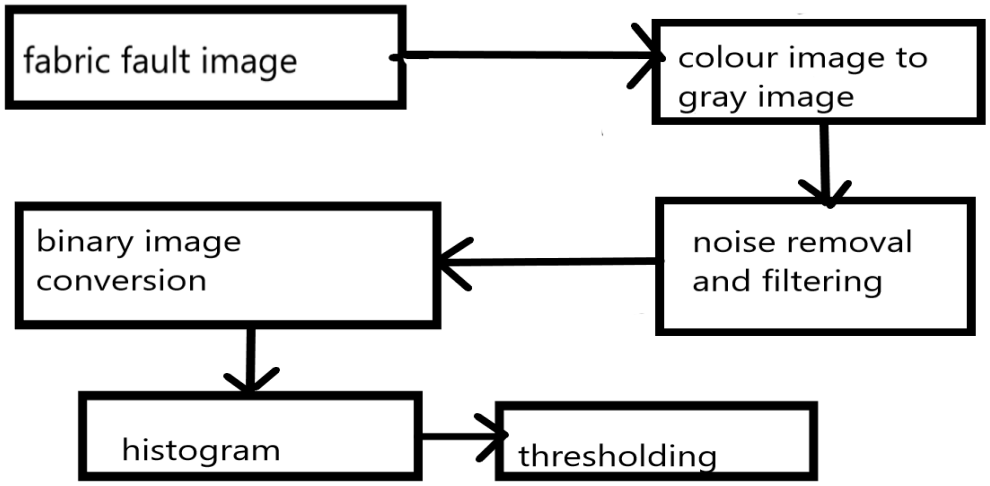

Fig.2:System architecture of DIP Based Automatic Fabric Fault Detection

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3. Fabric Fault Detection using Digital Image Processing.

Fabric detection plays role quality control. This may affected the economical growth of the industry when the old method which are used fault detection such as human visual inspection. They can used regular Band base methodology. It produce highest quality in shortest period. When the defect detection or inspection is a process identifying and locating defect. It is describe to produce the highest quality goods in the shortest period of time possible. Quality inspection is important aspect of industrial manufacturing. When the fabric fault can occur due to either machine faults, hole, Color bleeding , yarn problems, poor finishing, dirt spot, excessive stretching, crack point. In image preprocessing plays the important role in the input image provided to the system will be the real time image and will be compared with the database available with the system.[3]

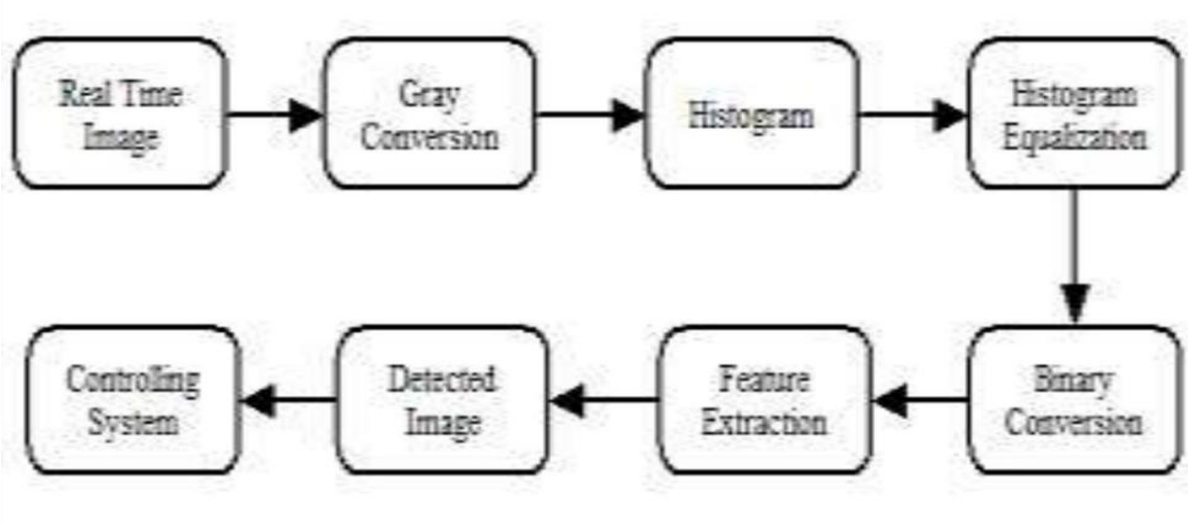

Fig.3: System architecture of Digital Image Processing

III.PROPOSED WORK

Manually checking for the fabric fault using a human is a tedious task. The accuracy depends upon the skill of human operator and varies from person to person. The main objective of proposed system is to detect faults in fabric using Computer vision with Template matching. The camera will monitor the continues images of fabric sheet on the conveyor belt, where any present faults will get detected by proposed system and the motor will be stopped. The faulty part of the sheet will get cut aside from that fabric sheet.Quality is an important aspect in the production of textile fabrics. 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. Therefore, to detect, to identify, and to prevent these defects from reoccurring is essential.

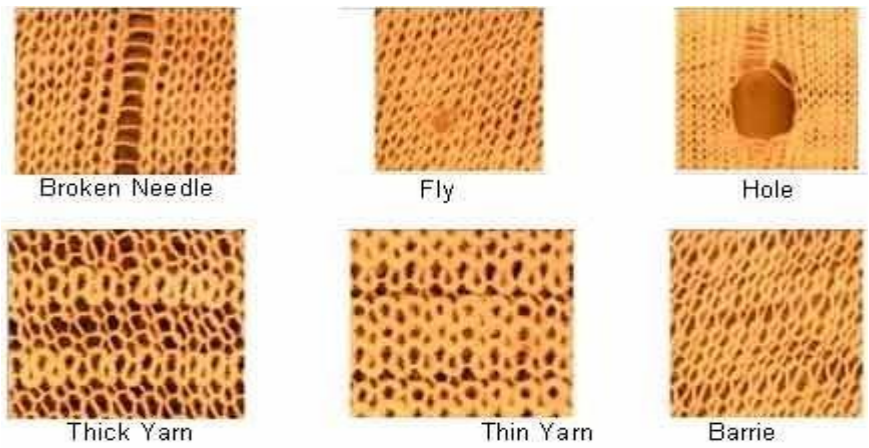

Fig.3.1: Different types of fabric faults

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Working:

Used Technique: Template Matching

In template matching technique, a template image can be matched with source image. It is a pattern matching mechanism. Template matching has an accuracy factor, which is called as threshold. Using this we can effectively create fabric fault detection system using this template matching as a solution. We will train the system with images of different types of fabric fault, then using those images as template it will easily match it with a faulty fabric, but there are different variations in fabrics. If the accuracy rate is set to 50%, the chances of the system to detect fault more effectively is more than it is set at accuracy level 100%.In different cases the accuracy rate is set to 80%.

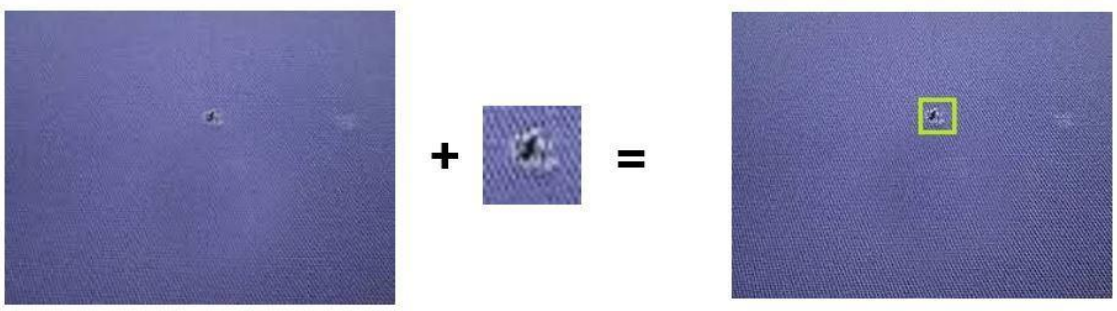

Fig.3.2: Resulted images after applying template matching

In this template slides across the original image. It compares the template to the portion of the image directly under it as it slides. The matching is done by calculating a number. This number is the percentage at the extent to which the template and the portion of the original are equal. The actual number depends on the calculation used. Some denote a complete match by a 0 (no difference between the template and the original) or a 1 (indicating a complete match).

Template image slides over the source image. The template and portion of input image under the template are compared. The result obtained is compared with the threshold. If the result is greater than threshold, the portion will be marked as detected. In the function cv2.matchTemplate (img gray,template,cv2.TM CCOEFF NORMED) the first parameter is the main image, second parameter is the template to be matched and third parameter is the method used for matching.

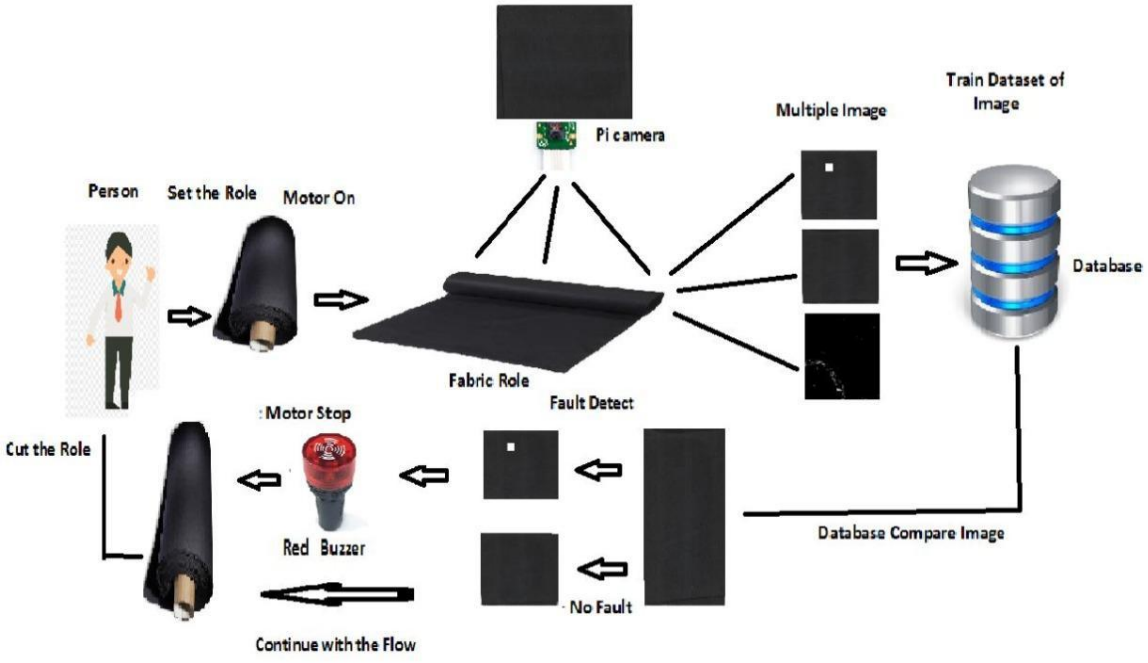

Fig.3.3: System architecture

In computer vision recognition is a very important problem. Often in a recognition problem, we have several possible models that a candidate may match against, and we must test each one to see which fits the data best. Normalized correlation is again a powerful tool for determining the quality of the match. The way in which we are using it is different, though. Instead of moving around a template to find the best fit (the detection/estimation task), we are comparing multiple templates to the same part of the signal (the recognition/classiffication task). For avoiding the issue which occurs due to different sizes of the template and source image we will use Multi-scaling. In case where, just because the dimensions of your template do not match the dimensions of the region in the image you want to match, does not mean that you cannot apply template.

IV. CONCLUSION

Using this method we can detect the fabric faults. The method discussed in this paper will be capable of detecting fabrics defects with more accuracy efficiency. Human inspection dose not achieved desired result because human visual inspection is tedious, tiring involving observation, attention experience to detect faults correctly. Currently the faults are inspect manually. The faults have been collected then should be written down and recorded on a fault analysis card or chart. It will easy to identify faults on fabric images and process by using this method. Faults such as hole, scratch, fading and other faults on fabrics can be identified and processed. The manual textile quality control usually goes over the human eye inspection. Notoriously, human visual inspection is tedious, tiring and fatiguingtask, involving observation, attention and experience to detect correctly the fault occurrence.

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