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A Hybrid Model to Identify Flaws in Textile

Kamaldeep Kaur[1], Deepak Goyal[2], Neeru[3]
[#1, 3]Deptt. Of ECE, B.B.S.B.E.C, Fatehgarh Sahib, Punjab
[#2] C-DAC, Mohali, Punjab

ABSTRACT: *The objective of fabric inspection is to ascertain whether the fabric received is of expected Quality standard or not. The main objective is detection of fabric defects as early as possible so that time and money are not wasted in the manufacturing, process. The ultimate goal of any quality control activity in clothing' industry is to satisfy the customers. Most defects in cloth occur while it is woven on the loom. Some of these fabric defects are visible, while others are not. Again some fabric defects may be rectified during weaving and after weaving while others are not. Often inspectors are given the responsibility of inspecting finished garments manually without adequate training in fabric defects and their causes. Detection of defects was generally carried out by time-consuming and tedious human inspection. Such manual inspection procedures are commonly agreed upon to be inefficient with detection efficiency suffering from deterioration due to boredom and lack of vigilance. The problem is accentuated by the presence of several types of defects those may occur in woven fabric at random. As we know that fabric are the main and costly raw materials of a garment. So it is very important to use fabric efficiently and control wastage of fabric. On the other hand fabric defects are the maximum defects of garments, for which many-unexpected problem may occur in a clothing industry. Such as- short shipment, discount, low price etc.*

Keywords: *Fabric inspection, Hybrid model, YCBCR technique, Wavelet transform (WT), Image distance difference algorithm.*

I. INTRODUCTION

The production of quality fabric is the foremost goal of the modern textile industry. Typical textile mills employ humans to inspect and grade the fabric in the production facility. The job is monotonous, as it requires the employee to sit at an inspection frame and watch as fabric that is 5-9ft wide passes over the board at speeds ranging from 8-20 yards a minute, all the while visually scanning that wide area of fabric for possible defects as shown in Fig.1 Traditional fabric inspection. The average human inspection department is only able to find 60%-75% of existing defects, which translates into a substantial amount of second quality shipped or returned. This alone leads to a considerable reduction in production efficiency, as most customers will only accept a certain percentage of second quality fabric in their order, meaning that the production facility must spend time producing re-work to be able to meet the customer demands. In an effort to improve the efficiency of inspection departments and subsequently reduce the costs of production, textile manufacturers have begun turning to automate inspection systems. An automated inspection system usually consists of a computer based vision system. Because they are computer based, these systems do not suffer the drawbacks of human visual inspection, such as fatigue, boredom, or inattentiveness. Automated systems are able to inspect fabric in a continuous manner without pause.

Fig.1 Traditional fabric inspections.

In this paper, a new fabric defect detection algorithm based on YCBCR technique is proposed. This technique is used to have more accurate results.

II. FABRIC DEFECTS

In fabric field there are different types of faults such as scratch, hole, dirty spots, color bleeding etc. If these faults are not detected properly it will affect the production system
massively.

Major and Minor Defects

The following definitions are central to fabric inspection:

Major Defect: A defect that, if conspicuous on the finished product, would cause the item to be a second. (A "second" is a garment with a conspicuous defect that affects the salability or serviceability of the item.

Minor Defects*:* A defect that would not cause the product to be termed a second either because of severity or location. When inspecting piece goods prior to cutting, it is necessary to rate questionable defects as major, since the inspector will not know where the defect may occur on the item.

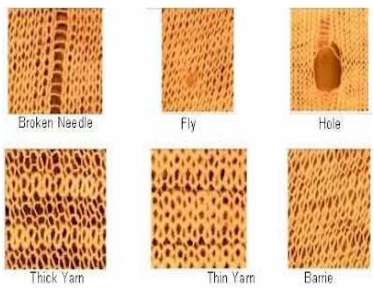


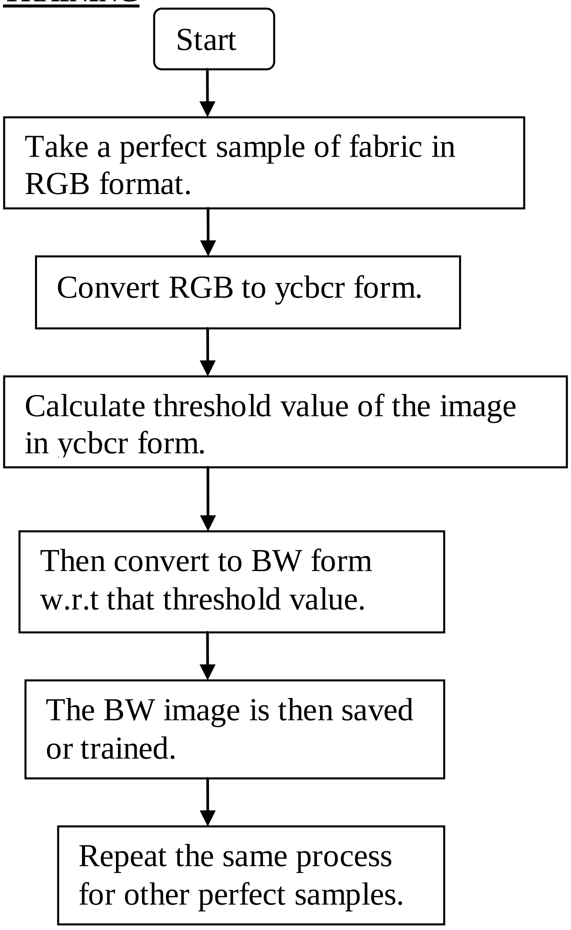
Fig.2 Defects in fabric

III. YCbCr TECHNIQUE

One of two primary color spaces used to represent digital component video (the other is RGB). **YCbCr**, **Y′CbCr**, or **Y Pb/Cb Pr/Cr**, also written as YC_BC_R or $Y'C_BC_R$, is a family of color spaces used as a part of the color image pipeline in video and digital photography systems. The difference between YCbCr and RGB is that YCbCr represents color as brightness and two color difference signals, while RGB represents color as red, green and blue. In YCbCr, the Y is the brightness (luma), Cb is blue minus luma (B-Y) and Cr is red minus luma (R-Y).

YCBCR = rgb2ycbcr(RGB) converts the truecolor image RGB to the equivalent image in the YCbCr color space.

TRAINING



If the input is uint8, YCBCR is uint8, where Y is in the range [16 235], and Cb and Cr are in the range [16 240]. If the input is a double, Y is in the range [16/255 235/255] and Cb and Cr are in the range [16/255 240/255]. If the input is uint16, Y is in the range [4112 60395] and Cb and Cr are in the range [4112 61680].

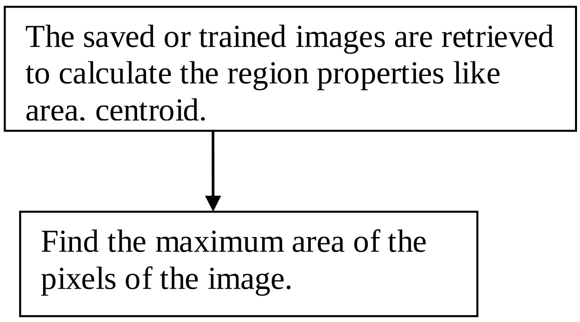
YCbCr and Y′CbCr are a practical approximation to color processing and perceptual uniformity, where the primary colors corresponding roughly to red, green and blue are processed into perceptually meaningful information. By doing this, subsequent image/video processing, transmission and storage can do operations and introduce errors in perceptually meaningful ways. Y′CbCr is used to separate out a luma signal (Y′) that can be stored with high resolution or transmitted at high bandwidth, and two chroma components (C_B and C_R) that can be bandwidth-reduced, subsampled, compressed, or otherwise treated separately for improved system efficiency.

IV. METHODOLOGY OF PAPER

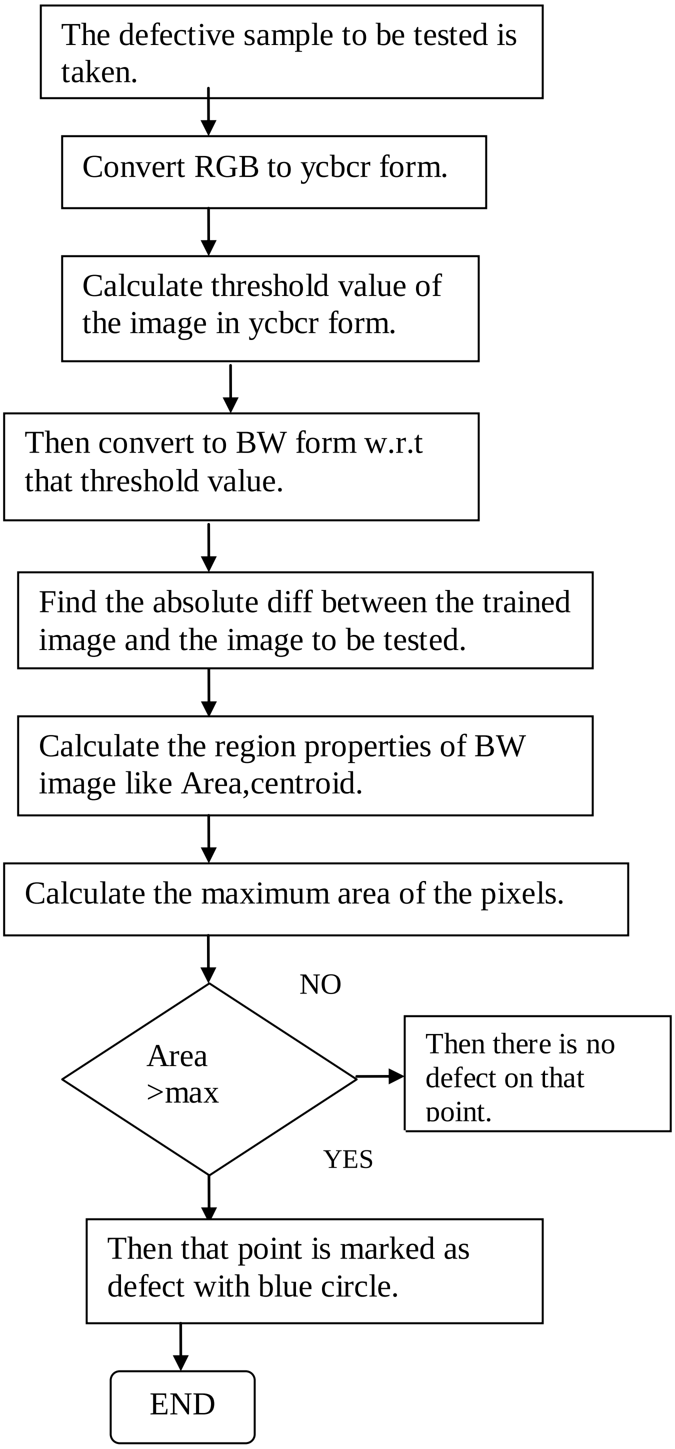
Our defect detection system consists mainly of three parts: **Training, feature extraction and testing (detection).**

- The training and feature extraction part uses wavelet transform (WT) technique in decomposition of image into wavelets.
- The testing (detection) part utilizes image distance difference algorithm to find the absolute difference between the trained and tested image.

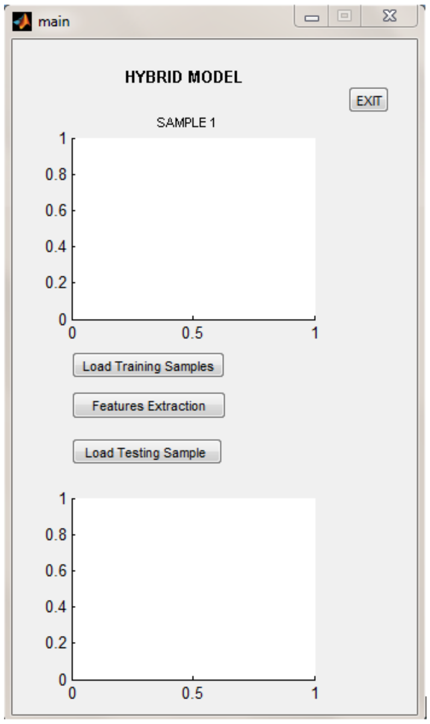
FEATURE EXTRACTION

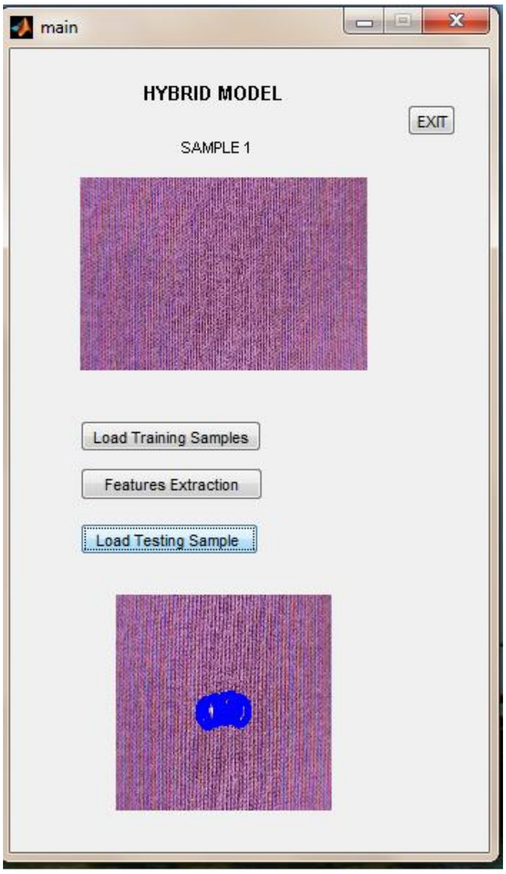


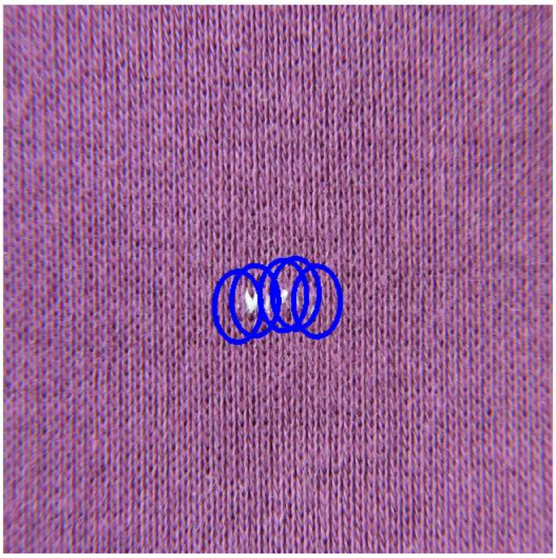
TESTING



SIMULATION RESULTS







V. CONCLUSION

The conclusions from this paper suggest that the combination of Wavelet Transform and image distance difference algorithm approaches can give better results than any single approach, and is suggested for further research. Experiments show that using YCbCr color space technique has improved the detection performance of the defective fabric.
As it is simple and efficient, it is also appropriate to real-time defect detection.

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