Color and Texture Measurement of Fabric using Image Processing for Fabric Industry Automation

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Abstract— Clothing luxury is solitary of the prime ongoing treats of textile and garment processes. Here characteristic is established on the human sense feedback to clothing materials and is resolved by a collection of thermal, physiological and mechanical specifications. For fabrics that come into straightforward connection with the skin, touch and tactile estates are exclusively crucial in relation with clothing luxury. Critical details of mechanical contentment concern tactile worth, including roughness. There are two logics for calibrating surface roughness: firstly, to regulate manufacturing, and secondly to benefit to establish that products execute well. In this research work color and design that is texture of the fabric is checked in the process of design of the fabric in textile industry automatically by the machine and if color discovered is not up to the mark then further processing will not be done. The Work is carried out with the objectives to propose the best color and texture method for the fabric with application to fabric industry on the basis of the proposed methodology.

Key words: Fabric, Texture, Color, Fourier Spectrum

I. INTRODUCTION

The color is the prime sensation that the consumer distinguishes and handles as a device to acquire or refuse the product, due to the color perception owns the unmasking of positive anomalies or deformities of a product [1]. Therefore, color measurement is an important tool in the hands of food technologists for determining and monitoring quality of the food brand. It could also act as a means of certain processing conditions. Color measurement can be used to follow the advanced Maillard reactions in milk [2].

The different industries involvements with color measurement incorporate paints, photography, textiles, ceramics and plastics. In glimpse of the consequence of color characteristic, color measurement techniques also achieve relevance for auditing the color variations in other products.

Image processing as well as image analysis is admitted as being the origin of computer vision. Image processing associates an array of image movements that appreciate the nature of an image [5]. Recently, automatic analysis systems, essentially based on camera - computer technology have been explored for the sensory investigation of agricultural and food outputs. This arrangement noted as computer vision has determines to be fortunate for objective assessment of different agricultural and food products. Computer vision includes the capturing, processing and analyzing images, facilitating the objective and nondestructive assessment of visual quality characteristics in products [6].

II. LITERATURE SURVEY

E. Z. Stoyanova [7] treated the issues describe with image processing in CAD/CAM structures software in knitting industry automation. The graphics images and theirs handling are the base part from the CAD/CAM structures software. The alternate ultimate relevant part of it is the design methods for an automatic creation of execution units regulate programs. In the knitting industry, these programs regulate the knitting machines for creation of resolved knitting structures and products, which is sharply related with object images. In this paper, the image processing techniques for knitting industry automation are proposed. The using methods suggested in this paper are: transformation of gray level images to binary images; path tracing for recognition of digital straight line. The trace algorithm is extended by different operations: translation of the current dot; next dot searching in next levels. This method is reliable in a CAD/CAM structure for cotton knitting industry automation. The procedure is used is the CAD/CAM system software. The program for the transfer mechanism movement is designed on the base of the trace procedure. This program represents loop carrier jack movement for realizing a appropriate knitted structure. C++ programming language is utilized. The program is a part of the whole CAD/CAM structure software for cotton knitting industry automation. The CAD/CAM system is made for the needs of "YANA – Pleven" Ltd.

A new quality of the digital image analysis is characterised by the works of Wood [8], and Wu, Pourdeyhomi & Spivak [9], who tested and estimated carpets during usage. These researchers used frequency methods based on the Fourier transform for image analysis. Thanks to this new procedure it became possible to identify structural faults. An algorithm for image digitisation, which served to estimate morphological nonwoven features such as porosity, fibre orientation distribution in the nonwoven, and reckoning of the fibres' uniformity circulation in webs has been developed by Huang and Bresee [10].

L. Suyi et al. [11] studied the detection of fabric color divergence and classification problems. First, to the question of color changes and analysis of the characteristics of different color space, author select the L * a * b * color space model. In this technique the color variation is converted into a geometric distance, so we can distinguish the color difference with the corresponding calculation. For the complexity of color divergence classification, we acknowledge that the arrangement of color difference is fuzzy, so we use fuzzy technique to characterize it and fuzzy neural network to exhaust the classification.

Based on distinguishing the fabric patterns which have color difference, the calculation outcomes display the technique is competent. On this support, 20 color difference samples classified. Analyzing the outputs of the arrangement, author found that the technique can analyze the size of color difference correctly. Therefore, one can assume that the color difference of the fabric detection and classification techniques is effective and feasible in the paper. Finally, for the detection and classification of color

difference of the fabric samples, characteristic and comparative analysis of the detection and classification results that the methods selected are effective and feasible.

Z. Zhou et al. [12] Culturally dyed fabric color distinction detection is established on the image color attributes in textile industry. However, relying entirely on the single image color attributes can't effectively identify dyed fabric color distinction with rich texture characteristics. In order to solve this issue, a new efficient color difference detection method based on multi-dimensional characteristics of Morlet Wavelet Kernel Support Vector Machine (MWSVM) is proposed in this paper. First of all the dyed fabric image to be distinguished is partitioned into a few appropriate sub-blocks in the LAB color space. The LAB histograms of the image in those sub-blocks are quotation. In addition, the Local Binary Pattern (LBP) algorithm is partitioned to extract the image texture features in those different divided regions. Then the Grey Relational Grade (GRG) amid the sample image and the detected image is computed. Finally the LAB histograms, the LBP attributes and the GRG are utilized as the input image data for the MWSVM algorithm to detect color difference of dyed fabrics. The experimental outputs show that the proposed technique can detect dyed fabric color difference more efficiently and accurately. The classification accuracy rate as high as 87.5%.

A. S. Nateri [13] stated that aim of their publication is to outline the probability of utilizing a scanner for the assessment of color variation or color difference of textile fabrics. In the starting state, the color specification of colored fabrics were calculated by spectrophotometers and the actual color distinctions amid colored fabrics were counted by the ΔE*ab color difference formula. Then, a scanner was utilized to take images of the textile fabrics. The obtained images were filtered for noise removal. The RGB values of the obtained images were used for the evaluation of textile fabrics color variation.

Several techniques were utilized to calculate the color difference by a scanner. The best prediction was calculated by the neural networks technique with 1.014 ΔE*ab. Using this technique, the accuracy of prediction for training sets was much better than that for the testing sets. The achievement of each technique calculates on the color difference values. so that, for low and high color variation, the best prediction was calculated by neural network, and for median color difference, the best prediction was obtained by the multi linear regression technique. The obtained results reveal that the color variation of textile fabrics can be estimated and calculated by using scanner RGB variation.

III. PROPOSED METHODOLOGIES

A. Texture Measurement (TM)

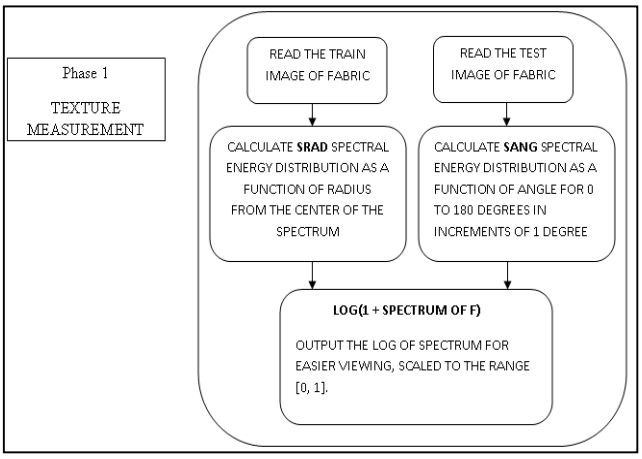

Fig. 1: Flowchart of texture measurement methodology

B. Color Measurement (CM)

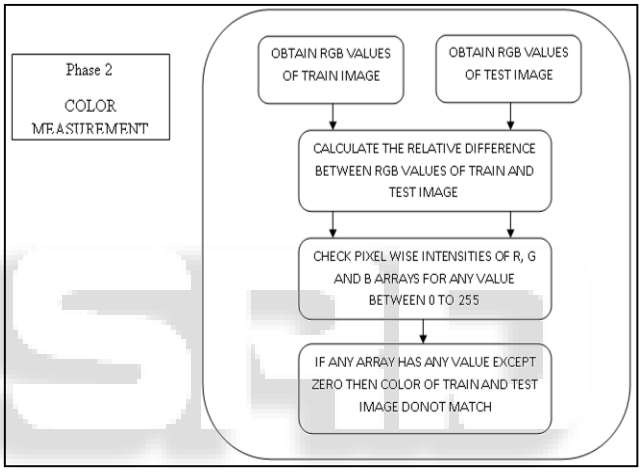

Fig. 2: Flowchart of color measurement methodology

IV. RESULTS

This section of paper aims at providing the results of proposed algorithms for color and texture measurement of fabric.

A. Implementation Results of Techniques

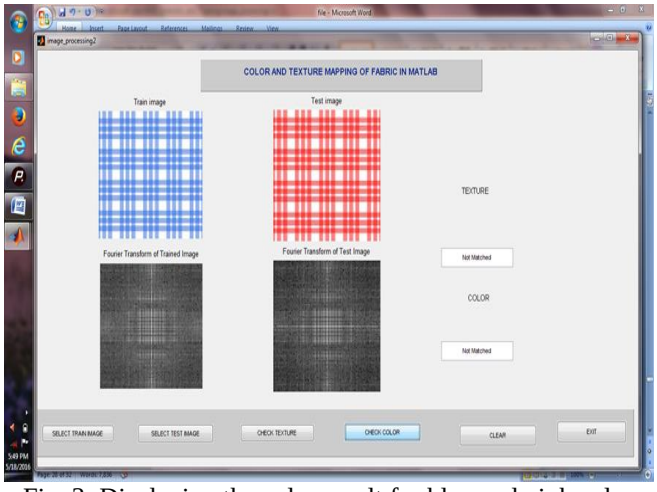

Fig. 3: Displaying the color result for blue and pink color fabric

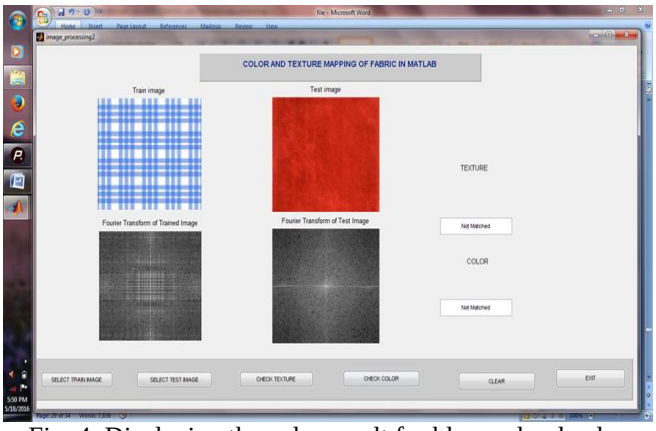

Fig. 4: Displaying the color result for blue and red color fabric

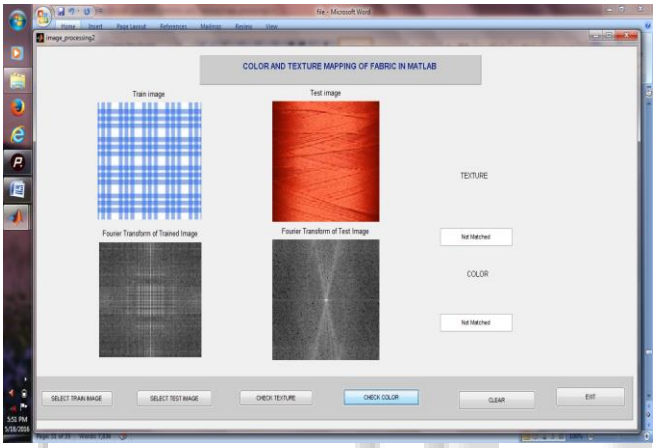

Fig. 5: Displaying the color result for blue and red thread color fabric

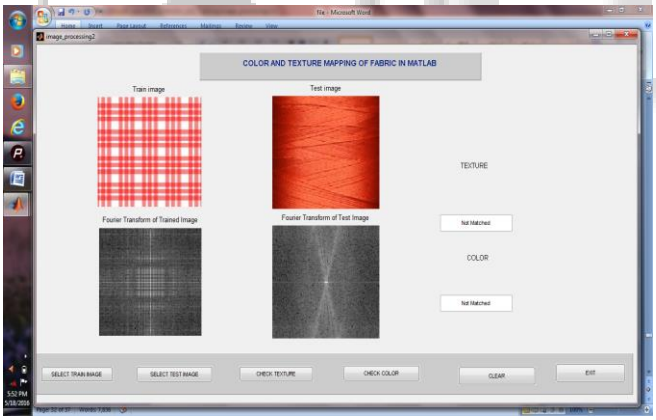

Fig. 6: Displaying the color result for pink and red color fabric

Fig. 7: Displaying the color result for green and blue color fabric

Fig. 8: Displaying the color result for same green color fabric

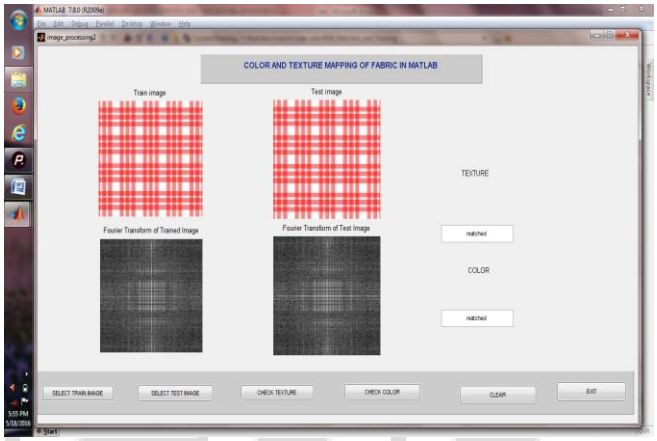

Fig. 9: Displaying the color result for same pink color fabric

V. CONCLUSION

The proposed combined methodology for measurement of texture and fabric shows good results for checking of design and colors. The proposed methodology works well for different designs and for different colors of the fabric. The basis requirement of this methodology is that colored fabric images should be taken by high quality cameras and also the size of fabric should be matched.

In the future work, the proposed methodology can be designed for different types of textures. It can be oval, round, parabolic and of any other type. Also the colors can be checked by different contrast measurement techniques.

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