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FACULTY OF ENGINEERING

DEPARTMENT OF TEXTILE AND GINNING ENGINEERING

REAL-TIME FABRIC DEFECT DETECTION SYSTEM USING IMAGE PROCESSING (MATLAB)

BY

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ABSTRACT

Quality inspection is an important aspect of modern industrial manufacturing. In textile industry production, automate fabric inspection is important for maintain the fabric quality. For a long time the fabric defects inspection process is still carried out with human visual inspection, and thus, insufficient and costly.

Therefore, automatic fabric defect inspection is required to reduce the cost and time waste caused by defects. The development of an online inspection system requires robust and efficient fabric defect detection algorithms. The detection of local fabric defects is one of the most intriguing problems in computer vision. Texture analysis plays an important role in the automated visual inspection of texture images to detect their defects. Various approaches for fabric defect detection have been proposed in past and the purpose of this project is to categorize and describe these algorithms.

This research project has shown that image analysis has great potential to provide reliable measurements for detecting defects in textile fabrics. Using the principles of image analysis, an automatic fabric evaluation system, which enables automatic computerized defect detection-(analysis of textile fabrics) was developed. On-line fabric defect detection was tested automatically by analyzing fabric images captured by a digital camera. The results of the automatic fabric defect detection correspond well with the experimental values. Therefore, it is shown that the developed image capturing and analysis system is capable of on-line detection of fabric defects and full control in the knitting and weaving machines (for example, by stopping the circular knitting machine as soon as a defect is acquired by the digital camera).

Obviously, fabric inspection has an importance to prevent the risk of delivering inferior quality product. Until recently, the visual defect detection is still under taken offline and manually by humans with many drawbacks such as tiredness, boredom and, inattentiveness. Usually, after the produced is doffed from the weaving machines, it is batched into large rolls and sent to the inspection department. A skilled stuff rolls the fabric at high speed on the inspection machine under sufficient light to identify all defects. Besides the mentioned drawbacks, the lag time exists between defect creation and detection causes more second choice fabric. Fortunately, the continuous development in computer technology introduces the online automated fabric inspection as an effective alternative.

A software package Matlab is used for this procedure using image processing algorithm.

DECLARATION

I SSEKASAMBA HAKIMU BU/UG/2010/130, a student of BUSITEMA UNIVERSITY under the DEPARTMENT OF TEXTILE AND GINNING ENGINEERING, hereby declare that this report, which portrays the details of my final year project, is of my own making, and that I have never used it anywhere or applied it in any other higher Institution.

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APPROVAL

This report has been handed in for examination with the approval of the following

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DR. NIBIKORA ILDEPHONSE

Signature: ..... Date: .....

MR. RWAHWIIRE SAMSON.

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First I thank God who made all this possible, despite the challenges that laid therein. I am so much grateful to my father who has struggled both socially and financially to see me attain a good education. The government of the Republic of Uganda, my sponsors who have financed my stay at campus, I am so pleasured to say thank you, and more critically, all tax payers. The administration of Busitema University, most specifically the Department of Textile And Ginning Engineering that was so concerned in directing this project. I can never forget my fellow students; you are a great crowd to hang around, both academically and socially. Keep the spirit.

DEDICATION;

This book is dedicated to my beloved family members in appreciation for their entire support throughout my course of study.

LIST OF ACRONYMS

MATLAB	Matrix Laboratory
GUI	Graphical User Interface
TransfFunc	Transformation Function
UNBS	Uganda National Bureau of Standards
BMP	Bitmap
JPEG	Joint Photographic Experts Group
PNG	Portable Network Graphics
TIFF	Tagged Image File Format
P	Pixel
MP	Mega pixel
RGB	Red Green Blue
GIF	Graphics Interchange Format
BPP	Bits per pixel
Cdf	Cumulative Density Function

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1.2 Problem statement

Increasing innovation in textile industry each year has led to the introduction of fabric processing machines which operate at very higher speeds in order to increase on the production and overcome the increasing competition in the world market. Because of this, human inspectors have found it hard to cope up with this speed and therefore end up making errors in the process of defect detection. Also the results produced by human inspectors vary from mill to mill which means inconsistency in quality and on top of that human inspectors are able to identify about 70% of the total defects in the fabric and cause a loss of about 35% on the profit to be acquired (*J Lewis dorrity and Warren Jasper 1996).*

Also the results produced by human inspectors vary from mill to mill which means inconsistency in quality and on top of that human inspectors are able to identify 70% of the total defects in the fabric.

1.3 Objectives of the research project

1.3.1 Main objective

- To develop and test a system that provides online fabric defect detection

1.3.2 Specific objectives

- To identify the main parameters which affect defect detection process
- To design and construct a system to demonstrate the utility of the developed methodology.
- Testing the computerized system to detect the defects.

1.4 Justification

There is a major issue of less number of defects in the fabric identified as compared to the total number of defects in the fabric hence 70% (*J Lewis Dorrity and Warren Jasper 1996)* defects are detected by the traditional human inspection method leading to inaccuracy in fabric defect detection. It is even worse at higher production speeds which are being employed in many machines nowadays. The Online fabric defect detection system will increase on the accuracy of detection since it is known that machines are more accurate than human beings and also can be used at higher operating speeds. Due to this so increased accuracy, the fabric quality will be increased which will increase on the firm's competitiveness level. A system that can detect more than 80% (*hemda and tallah 2008*) of the defects in the fabric without stopping the machine and at a higher speed, with minimum error and reproducible results

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