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FACULTY OF ENGINEERING

DEPARTMENT OF TEXTILE AND GINNING

FINAL YEAR PROJECT WORK

AUTOMATIC RECOGNITION OF WOVEN FABRIC STRUCTURES USING DIGITAL IMAGE PROCESSING AND ARTIFICIAL NEURAL NETWORKS

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SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF BACHELORS OF SCIENCE IN TEXTILE ENGINEERING OF BUSITEMA UNIVERSITY

DECLARATION

I **NalunkumaNulu** hereby declare to the best of my knowledge that the work presented in this report is original and have not been presented in any institution anywhere for any degree, diploma or any award.

Signed ......NN................

NALUNKUMA NULU

Date ...10-06-2015

APPROVAL

This project work has been submitted with the approval of;

Dr. NIBIKORA ILDEPHONSE

Signed..................... Date....10/6/2015

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DEDICATION

To my dear Husband Mr. Umar Bashir Matovu and family, My Parents and Guardians who have done their very best to ensure that I get good education, and my Aunt Resty Kyeyune for her sacrifice. May the almighty ALLAH reward them the best.

ABSTRACT

The current method used to recognize structures in Textile mills in Uganda like Southern Range Nyanza Limited involves the use of magnifying glasses and sometimes pulling of single yarns from the woven fabric. This method is not only of low efficiency and time consuming, but also very tedious and subjectively affected by the knowledge and experiences as well as mental and physical condition of inspectors. It limits the number of structures that can be produced by a textile mill. It also causes strain to the eyes hence there is need for an automatic programme for recognizing woven fabric structures.

This report consists of the new method established for automatic recognition of woven fabric structures based on digital image processing and artificial neural networks. This method is a combination of image processing techniques (grayscale, histogram equalization and median filtering only), textural Feature extraction using GLCM (correlation, contrast, entropy, energy, homogeneity) and the algorithm of single layer feed forward back-propagation of the stochastic gradient descent rule.

In this case, the images were captured through a scanner with a resolution of 1200 × 2400 dpi.

The program was provided with a user friendly Graphical User Interface.

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List of acronyms

ANNs...Artificial Neural Networks

GUI...Graphical User Interface

FFNN...Feed forward Neural Networks

RNN...Recurrent Neural Networks

GLCM...Gray Level Co-occurrence Matrix

CHAPTER ONE

1.0 Introduction

1.1 Back ground of the study

Fabrics can either be woven, knitted or nonwoven. Woven fabric structures consist of two sets of yarns that are interlaced and lie at right angles to each other. The threads that run along the length of the fabric are known as warp ends whilst the threads that run from selvedge to selvedge, that is from one side to the other side of the fabric, are weft picks. Frequently they are simply referred to as ends and picks. In triaxial and in three-dimensional fabrics yarns are arranged differently. Most two-dimensional woven technical fabrics are constructed from simple weaves and of these at least 90% use plain weave. **(Walter S Sondheim, 2010).**

Woven fabric appearance, properties and end uses are affected by the way it was constructed:

- In plain- weave fabric the warp and weft are aligned so that they form a simple criss-cross pattern. Plan weave is strong and hardwearing, so it's used for fashion and furnishing fabrics.
- In twill-weave fabric the crossing of weft and warp are offset to give a diagonal pattern on the fabric surface. It's strong, drapes well and is used for jeans, jackets and curtains.
- In satin-weave fabric there is a complex arrangement of warp and weft threads, which allows longer float threads either across the warp or the weft. The long floats mean the light falling on the yarn does not scatter and break up, like on a plain weave. The reflected light creates a smooth, lustrous surface commonly called satin and common applications include party dresses and others.

Plain weave fabrics have higher shear rigidity than other weaves because of more yarn to yarn interlacing in the fabric with smaller float. The fabric produced with plain weave give compact structure resulting in lower thickness as compared to other weaves structures hence suitably used for bed sheet for example. **(Behera et al.2010)**

The performance of clothing materials can be classified as;

- utility performance measured in terms of strength, durability and others
- comfort performance evaluated by considering mechanical fitting to human body and physical comfort
- Fabric performance during clothing manufacture. **(Behera et al.2010)**

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