



**BUSITEMA
UNIVERSITY**
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF GINNING AND TEXTILE ENGINEERING

**WET BLUE LEATHER GRADING USING FUZZY
EXPERT SYSTEM**

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**Final year project submitted in partial fulfillment of the award of Bachelor of
Science in Textile Engineering of Busitema University.**

May, 2015

ABSTRACT

Wet blue hides defect extraction and classification has remained as the centre of research for the leather tanning industry although the investigation in this domain was first reported around one century ago. Several mathematical, statistical and empirical models have been developed in the past only to yield limited success in terms of accuracy and general applicability.

In recent years, soft computing tools like artificial neural networks and neural-fuzzy models have been developed, which have shown remarkable prediction accuracy. However, artificial neural network and neural-fuzzy models are trained using enormous amount of noise free input-output data, which are difficult to collect from the leather tanning industries.

In contrast, fuzzy logic based models could be developed by using the experience of the grading personnel only and it gives good understanding about the roles played by various inputs on the outputs.

This project therefore deals with the modeling of wet blue leather grading using a simple fuzzy expert system. The grading accuracy of the model was found to be very encouraging.

DEDICATION

This report is dedicated to my dear parents Mr. Oketta James and Mrs. Oketta Teopista for their tireless contribution and words of encouragement. May the almighty God bless and reward them abundantly.

ACKNOWLEDGEMENT

I respectfully wish to thank Dr. Nibikora Ildephonse, management of Jambo Tannery and the entire department of Textile Engineering for their assistance offered to me during my project report preparation.

Never the less I am very grateful for my family, friends and classmates for their wonderful words of encouragement, assistance, moral support and company.

DECLARATION

I hereby declare that this piece of work is my own original work and has never been submitted wholly or partially to any University or any other institution of higher learning for any award.

Signature.....

Date.....27/05/2015

OTIM MICHAEL



APPROVAL

This is to certify that the Final year project report under the title **“WET BLUE LEATHER GRADING USING FUZZY EXPERT SYSTEM”** has been done under my supervision and is now ready for presentation to the Department of Textile Engineering, Busitema University.

Signature: 

Date: ... 27-5-2015

DR. NIBIKORA ILDEPHONSE

SUPERVISOR

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LIST OF ACRONYMS

AI – Artificial Intelligence

ES – Expert System

FAO – Food and Agricultural Organization

FIS – Fuzzy Inference System

TR – Tannery Run

CHAPTER ONE

INTRODUCTION

1.1. Background of the study

Tanning is the process that converts the protein of the raw hide into a stable material which will not putrefy. The most commonly used tanning material is chromium, which leaves the leather, once tanned, a pale blue colour (due to the chromium), this product is commonly called "wet blue". (http://www.en.wikipedia.org/wiki/Leather_production_processes accessed on 25/09/2014).

Leather is one of the world's most widely traded commodities. The leather industry in total produces over 18 billion square feet of leather a year, and the total value of this is estimated at over \$60 billion. Developing countries now account for over 60% of the world's leather and this proportion is growing. This puts Africa and Uganda in particular, at the center of the booming leather industry as a key supplier of hides and raw materials *FAO (2008)*. Hides and skins are by far the highest export earner from the livestock industry and are the only products from Ugandan livestock which have been able to break into the world-wide export market. Available statistics show that a container of hides for export from Uganda is composed of around 1500 hides, of which 100% are tannery run (TR), grades I (20%), II (30%) and III (50%). (<http://www.ugandainvest.com> accessed on 25/09/2014).

Although in several countries hides and skins are sold on a tannery run (TR) basis, or tel quel, meaning that the lots are mixed independently of the quality of individual hides and skins, it is recommended to sell hides and skins on a selected basis. Normally selling on a selected basis favours the shipper with a better price in the international market, and buyers are generally happy to pay more for a selected hide, which gives them some sort of a guarantee that the supplied material is suitable for the purpose they bought it. There is a general basis of a global selection standard. It is based on natural defects, manmade defects, size, shape, thickness and weight. The application of this general standard with the quantification of the defects per grade depends on each individual country. Climatic and environmental conditions play an important role. The better these conditions are the lower is the number of defects per grade. Price is related to overall quality and grading. The better the selection, the higher the price that can be demanded on the international market. It is fundamentally wrong to adjust the quality according to the price.

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