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A Neural Network Approach to Classification of Textile Defects

J.T.S. Priyadarshani



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Dissertation submitted to the Faculty of Information Technology, University of Moratuwa for the partial fulfillment of the requirements of the of M.Sc. (PG Dip) in Information Technology

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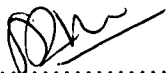
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Declaration

I declare this thesis is my own work and has not been submitted in any form for another degree or diploma at any other university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

JTS Priyadarshani
Name of Student


.....
Signature of Student

Date: 19/09/2011

Supervised by

Prof. AS Karunaratna
Name of Supervisor(s)

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Dedication

This Outcome is lovingly dedicated to Thaththa, Amma and Upul.



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JTS Priyadarshani
Faculty of IT

Abstract

All textile industries aim to produce competitive textiles. The competition enhancement depends mainly on productivity and quality of the textiles produced by each industry. Especially in the least developed countries like Sri Lanka, India, Bangladesh where textile is one of the main incomes of economy, still using manual quality control techniques to identify defects in their textile products. Therefore this study carries out to classify defects in textiles with minimum intervention of human being using artificial neural network technology and some principles of image processing techniques.

My approach is to identify defects in textile comprises three steps, namely, image processing, image classification and producing the output as a classification chart. I have used the standard techniques of image processing; while the image classification is handled by an ANN trained in the supervised mode with the aid of back propagation training algorithm. I have selected three major defect types of defects from textile quality process. They are cut hole damages, open seam of the garment and pen marks. Input data is a 185220x30 matrix and it is representing 30 samples of 185220 elements. The output of the system will be an image file with a defect classification chart. In fact, basically this system is able to classify defects in to three categories.

This system mainly is divided in to three sections namely; image processing module, neural network module and output generator module. But the system design is separated in to two parts. The first part of the research processes the images to fit for the input layer of the neural network. The second part uses the input set to classify the defects and adapts the neural net.

The prototype develop in this project have been trained to identify cut hole damages, open seam and pen mark of the garments by considering 300 images. A concatenate image, which contained 300 samples of each defect type, was trained and tested. The accuracy rate of recognizing the numbers and symbols were 77%. However this accuracy rate is very high.

Using the neural network technology and back propagation learning algorithm, to classify textile defects were successful even there was a high probability to misclassify different types of defect images with different range of severity rates.

Keywords: Neural network, Back propagation learning algorithm

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