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Fabric Defect Detection using Image Processing CNN

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***Abstract*:** To maintain the good quality of fabric, inspection is important. In Fabric industry the inspection is done manually which are time consuming, stressful and involves more manpower. This traditional inspection for fabric defects is insufficient and costly. To improve the performance, automated fabric defect detection plays a vital role. This methodology results in production of high quality products with less time. The image processing techniques are applied for the input defective fabric, convert into grey scale images, noise filtering ,binary image conversion, thresholding and the calculated output is received. The automated system based on deep learning algorithms is used to detect the defect. The proposed system will efficiently detect the fabric defects with improved accuracy in less time.

Keywords: Image Processing, Neural Network, Fabric, Defect detection, Fabric inspection

I. INTRODUCTION

In textile industry Fabric defect detection is an important part of quality control. The study reveals around 85% of the defects are due to the fabric. The textile industries are aiming to produce good quality fabrics with high production rate. The fabric with defects or faults yields only 45% to 65% of the profit from the second's sale. This faulty fabric is the major loss in the textile industry. The manual inspection which involves the skilled labour or technician in the defect detection is not only costly but may not be as accurate as the automated fabric defect detection. The automated defect detection results in less labour cost and more accurate.

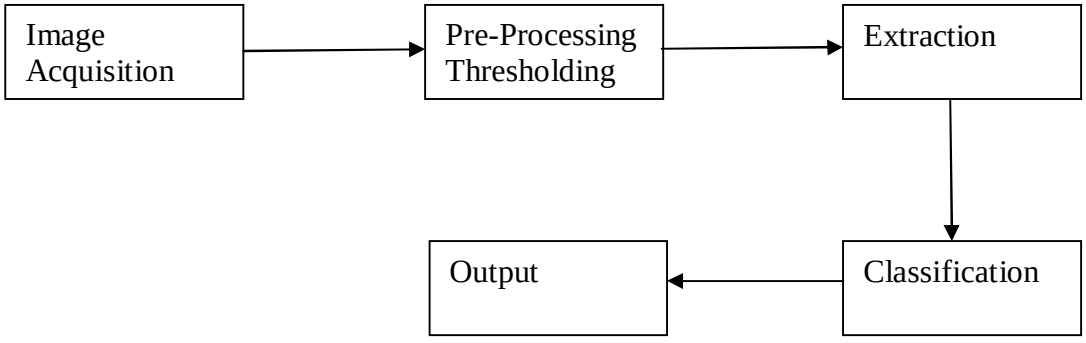
Image processing plays an important role in detection of fabric fault. The images of the defect or faults are converted to grey scale image in pre-processing. The next step involves feature extraction such as various features like shape, size etc. The patterns of defect and non-defects are classified. Thus the output is obtained.

II. FABRIC DEFECT TYPES

There are different types of defects classified in textile industry. The defects can occur in weaving, knitting and dying. Listed are some of the defects.

A. Machine faults
B. Hole
C. Strain
D. Yarn problems
E. Scratch
F. Poor finishing

III.METHODOLOGY



A. Image Acquisition

The range of different faulty images are stored as set of files and given as input. This also includes non-faulty images or verification.

B. Pre-Processing

In thresholding a grey level image is converted into input image. Pre-processing also includes filtering of noises and other distortion though the images are captured in high resolution.

C. Extraction

The various features from the faulty fabric image such as size, shape and other required features are extracted as the accuracy of defect depends on this step.

D. Classification

The classifier compares the features obtained from the extraction and classifies the object within the image correctly [1].

IV. CONCLUSION

The proposed methodology explains about implementing the defect detection using CNN. Neural network (NN) models [51,114] can perform many tasks [115] such as feature extraction, segmentation and optimization.The tensorflow and keras in python plays a vital role in the proposed implementation.

TensorFlow [3] is an interface for expressing machine learning algorithms and an implementation for executing such algorithms. It operates at large scale and in heterogeneous environments. TensorFlow uses dataflow graphs to represent different states. It maps the nodes across different computational devices such as multicore CPU, GPU and TPU (tensor Processing unit).

Apart from other methods partially using NN in [14, 19,39,48,71,74,82,95], NN-oriented fabric inspection methods are depicted in Table 5. Stojanovic et al. [116] suggested a three-layer back-propagation artificial neural network for low cost fabric defect detection with off-the-shelf components. It achieved a detection accuracy of 86.2%.

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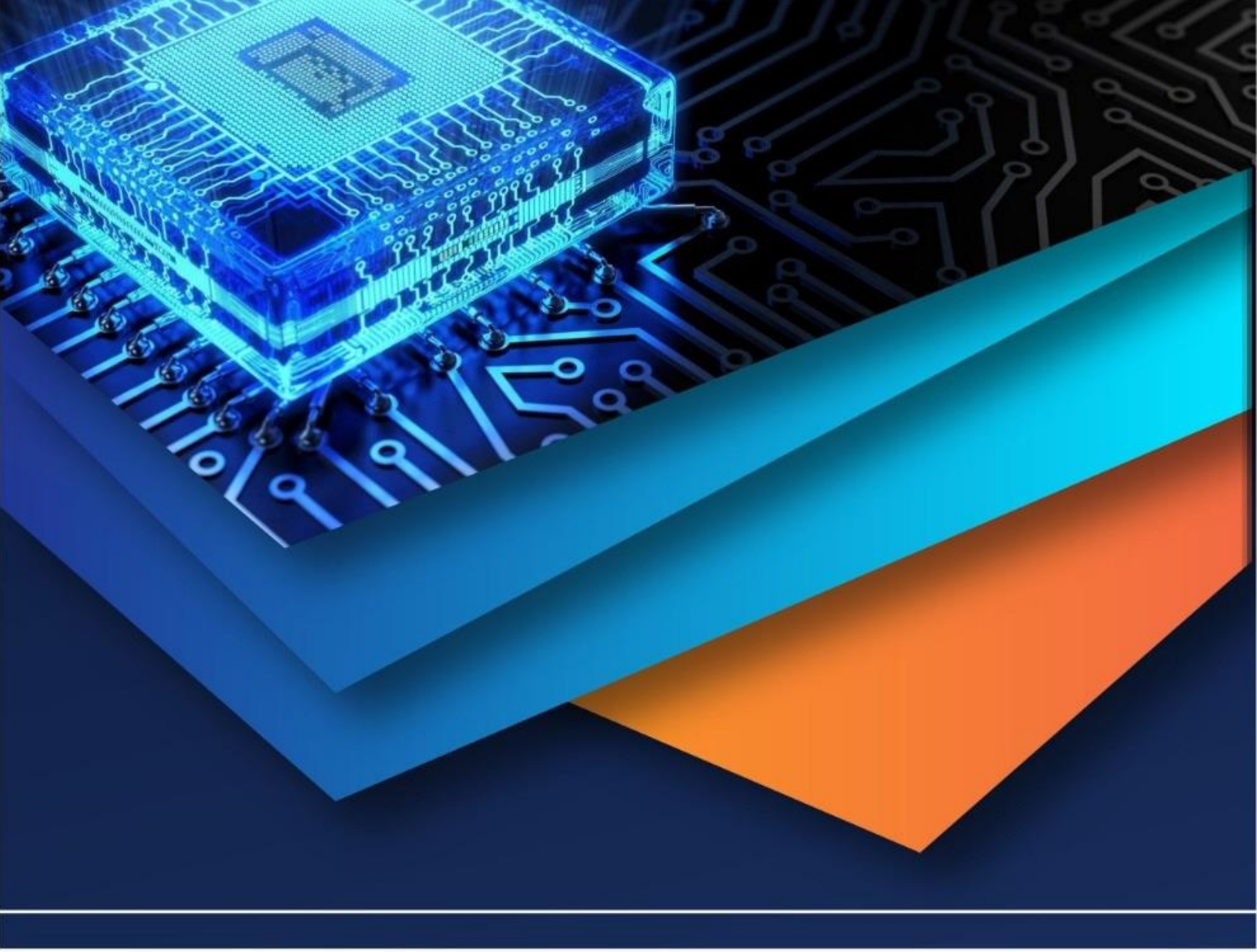

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