FAKE CURRENCY DETECTION

Arya S

M.Tech Student, Dept of Electronics and Communication
Marian Engineering College
Technical University Of Kerala
Trivandrum, Kerala, India
aryasudhakaran66@gmail.com

Dr.M.Sasikumar

Professor and Head, Dept of Electronics and Communication
Marian Engineering College
Technical University Of Kerala
Trivandrum, Kerala, India
drmsasikumar@yahoo.com

Abstract – **Fake currency notes are increasing day by day, in order to overcome this we proposes a very helpful and efficient system to detect the fake currency. For detecting the fake currency note is done by counting the number of interruptions in the thread line. For predicting the note is real or fake on the basis of number of interruptions. If the number of interruption is zero, if it is real note otherwise it is fake. And also we calculate the entropy of the currency notes for the efficient detection of fake currency note. MATLAB software is used to detect the fake currency note.**

Index Terms – Security thread, Image processing, Fake currency , Indian real currency, Black line.

I. INTRODUCTION

Fake Indian Currency Note is a term that refers to the counterfeit currency notes that rapidly circulated in the Indian economy. At the manufacturing time of real currency notes, the security thread is assimilated in to the paper, while in the fake currency notes, a line with gray ink is printed or an aluminum thread is used to paste two thin sheets of paper in order to imitate the security thread. It is difficult to reproduce the fake currency note with actual accuracy and to maintain the alignment of figures of real currency note. In this paper we have made fake currency note detection technique using the MATLAB algorithm. In the proposed method, acquired image of currency note through the camera is checked to real or not. To check the currency note is real or fake on the basis of counting the number of interruptions in the security thread. The camera pictures of notes are analysed by MATLAB program installed on computer. The proposed system is to check the Indian currency notes of 100, 500 and 2000 rupees. If the note is real, the respective message is appeared on the command window and vice-versa. Recently some fake currency detection techniques have been reported in the literature. Binod Prasad Yadav, C.S.Patil, R.R. Karhe, P.H Patil [1] presented Detecting Fake Currency it is very time consuming .The process is done by using feature extraction with HSV to detect the fake currency. Megha Thakur, Amrit Kaur [2] designing a system to identify the fake currency note by using various detection techniques and parameters on currency note. This methods can be used to efficiently and easily detecting the counterfeit currency notes. Kavya B R, Devendran B [3] proposed a system that recognize the fake currency note on the basis of extracted features of the currency note. Coherent matching of features, which helps in the SIFT techniques. Extracted features of currency notes, they are See Through register, Identification mark, thread, Governor's signature, Micro lettering, year of printing. W.K.El said [4] developed a feature extraction based system for detecting the fake Egyptian paper currency in efficient manner. In this process the extracted feature of currency is individually performed on original and sampled version of the currency note. On the basis of similarity measurements, independently acquiring the each side of the decision of currency detection. Tushar Agasti, Gajanan Burand, Pratik Wade P Chitra [5] proposed a system that recognise the fake currency note on the basis of accuracy. The extracted features of currency note is applied to the algorithm to improve the accuracy of note.

II. METHODOLOGY

We proposed a system to identifying the fake notes on the basis of thread line and entropy. The system consist of the following steps, they are image acquisition, image preprocessing, gray scale conversion, binary scale conversion, image segmentation, morphological operations, feature extraction and comparison of images.

A. Image acquisition
In this process we acquire the image with the help of camera or scanner.

B. Image preprocessing
In the pre-processing operations we convert the RGB color to HSV conversion. This conversion is very helpful for extracting the color feature of an image and cropping of an particular area of interest.

C. Gray scale conversion
The image of HSV color is converted in to gray scale. In a gray scale image, each pixel value representing only an amount of light and provides only intensity information. Gray scale images with only two colors they are black and white.

D. Binary Scale Conversion
In this section we convert the image in to binary image, for the purpose of detecting the boundaries. All pixels of input image with the luminance greater than the said level are assigned the value one and other pixels with value zero.
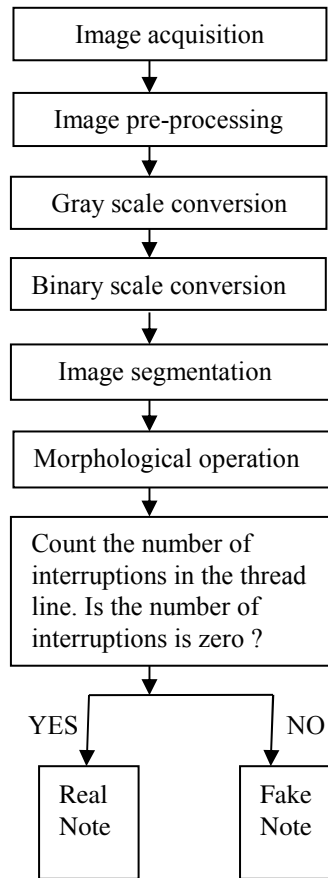
Fig 1. Block Diagram

Flow: Image acquisition → Image pre-processing → Gray scale conversion → Binary scale conversion → Image segmentation → Morphological operation → Count the number of interruptions in the thread line. Is the number of interruptions is zero ? → YES → Real Note / NO → Fake Note

E. Image segmentation

Image segmentation is used to distinguish objects from backgrounds. The aim of an segmentation is to simplify an image into something that is more meaningful and easier to analyze. Segmentation process is based on the value threshold and saturation threshold. In this section we cropped the images of real and fake. If the length of cropped image of security thread line is greater than that of the saturation threshold and if it is less than the value threshold; the boundary can be better detected.

F. Morphological operations

In this process we have to take a structuring element that having a vertical line, length and angle of degree. In the morphological closing we use imclose function. This function performs a morphological closing on the grayscale image. After the morphological closing we are using the bwareaopen function. This function removes all connected components from the binary image, producing another binary image is known as area opening.

G. Counting the number of interruptions

To count the number interruptions in the thread line of real

and fake images. If the fake image has more than zero interruptions and real note has only zero interruption.

III. MATLAB SIMULATED RESULT

In original note, the security thread is assimilated in to the paper at the time of manufacture. But in fake notes, a line with gray ink is printed or an aluminum thread is used to paste two thin sheets of paper. The security thread is a security feature of many bank notes to protect against counterfeiting. Entropy for real and fake note can be estimated in each stage of processing and the results are given in the table 1. The entropy increases with the disorders of the notes. Entropy is less in real note but it is high in fake note.

(a)

(b)

Fig 2. Images of Real Indian currency (a) and Fake Indian Currency(b)

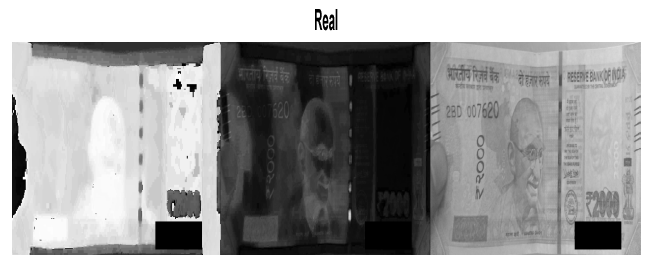The decomposition of real and fake images in to hsv is in the pre-analysis

Real

Fake

Fig 3. Pre-analysis of real and fake images

In the initial segmentation process we threshold the value and saturation.

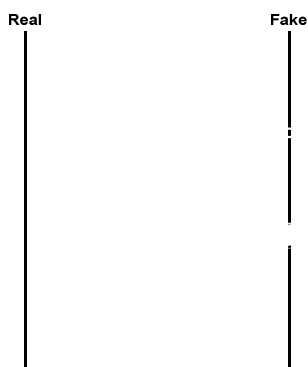Real   Fake

Fig 4. Intial segmentation of real and fake images.

In the post processing we do some minor closing operations.
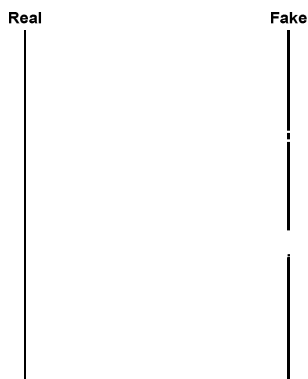
Real   Fake

Fig 5. Post processing of real and fake images

In the process of area opening removes black and white image in the pixel area that have less than a certain area.

Real

Fake

Fig 6. Area open the real and fake image

The final process is to count the number of interruptions in the thread lines of the real and fake note images. If the number of interruption is zero,it indicates the note is real, while there is more than zero, it indicates the note is fake.
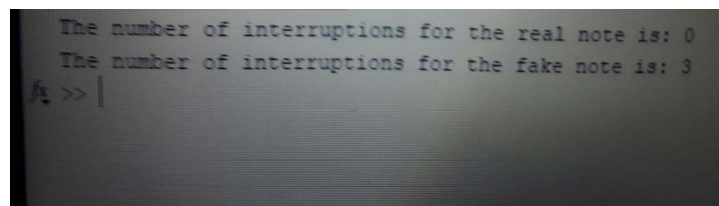

Fig 7. Command window shows the number of interruptions for the real and fake images

IMAGES	ENTROPY
Real note	6.0295
Fake note	7.7864
Pre-analysis of real note	5.7689
Pre-analysis of fake note	7.3378
Initial segmentation of real note	0.1116
Initial segmentation of fake note	0.3853
Post processing of real note	0.1014
Post processing of fake note	0.3914
Area open the real note	0.1
Area open the fake note	0.3876

Table 1. Experimental results of entropy estimation

IV. Conclusion

Counterfeit money has been increasing day by day and this leads to many problems in our Indian economy. One of the major problem is corruption this is due to the production of large amount of counterfeit money. Enormous increase in the fake currency note reducing the value of real money. Inordrer to overcome this counterfeit money fake currency detection proposed in this paper can be employed. The detection can be done using the MATLAB algorithm.

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