Fake currency Detection using image processing

Miss.Megha A.Sontakke

Assistant prof. Department of electronics and telecommunication Engineering

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Abstract:

The advancement of colour printing technology has increased the rate of fake currency note printing and duplicating the notes on a very large scale. Few years back, the printing could be done in a print house, but now anyone can print a currency note with maximum accuracy using a simple laser printer. As a result the issue of fake notes instead of the genuine ones has been increased very largely. India has been unfortunately cursed with the problems like corruption and black got advantages like simplicity and high performance speed. The result will predict whether the currency note is fake or not.

money .And counterfeit of currency notes is also a big problem to it. This leads to design of a system that detects the fake currency note in a less time and in a more efficient manner. The proposed system gives an approach to verify the Indian currency notes. Verification of currency note is done by the concepts of image processing. This article describes extraction of various features of Indian currency notes. MATLAB software.

Introduction

The advancement of colour printing technology has increased the rate of fake currency note printing and duplicating the notes on a very large scale. Few years back, the printing could be done in a print house, but now anyone can print a currency note with maximum accuracy using a simple laser printer. As a result the issue of fake notes instead of the genuine ones has been increased very largely. India has been unfortunately cursed with the problems like corruption and black money .And counterfeit of currency notes is also a big problem to it. This leads to design of a system that detects the fake currency note in a less time and in a more efficient manner. The proposed system gives an approach to verify the Indian currency notes. Verification of currency note is done by the concepts of image processing. This article describes extraction of various features of Indian currency notes. MATLAB software is used to extract the features of the note. The proposed system has got advantages like simplicity and high performance speed. The result will predict whether the currency note is fake or not.

processing on the image is done on that acquired image using concepts like image segmentation, edge information of image and characteristics feature extraction. MATLAB is the perfect tool for computational work, and analysis. Feature extraction of images is challenging task in digital image processing. It involves extraction of invisible and visible features of Indian currency notes. This approach consists of different steps like image acquisition, edge detection, gray scale conversion, feature extraction, image segmentation and decision making. Acquisition of image is process of creating digital images, from a physical scene. Here, the image is captured by a simple digital camera such that all the features are highlighted. Image is then stored for further processing .Process of Edge detection It is a basic tool in image processing. It is widely used in area of feature detection and extraction. This process aim at identifying point in digital image at which image brightness sharply changes Process of Image segmentation This process sub divides image into it sub regions. The level of division depends on the problem.

Segmentation algorithm for images which are monochromatic is based on properties of images like discontinuity and similarity.

Methodology

The system proposed here work here on the image of currency note under ultraviolet light acquired by a digital camera. The algorithm which is applied here is as follows

1. Acquisition of image of currency note under ultraviolet light by simple digital camera or scanner.
2. Image acquired is RGB image and now is converted to gray scale image.
3. Edge detection of whole gray scale image.
4. Now characteristics features of the paper currency will be cropped and segmented.
5. After segmentation, characteristics of currency note are extracted.
6. Intensity of each feature is calculated.
7. If the condition is satisfied, then the currency note is said as original otherwise fake.

In this method, characteristics of currencies are employed which are used by common people for differentiating for different banknote denomination. The characteristics that can be used to check the authentication of currency note are

A. Security Thread :
It is a 3mm windowed security thread with inscriptions of India in Hindi, RBI and 2000/500 on banknotes with color shift. Colour of the thread changes from green to blue when the note is tilted.

B. Serial Number : Serial number panel with banknote number growing from small to big on the top left side and bottom right side.

C. Latent image : A vertical band on front side of denomination at right hand size. It contains latent image showing numeral of denomination when banknote is held horizontally at eye level.

D. Watermark : The portrait of Mahatma Gandhi, and multidirectional lines and a mark showing the denominational numeral appear which can be viewed when held against light.

E. Identification : Mark A mark with intaglio print which can be felt by touch, helps blind person to identify the denomination. In 500 denomination the mark is of five lines while in 2000 line the mark is of seven lines.

The flow diagram of the process to be followed in the proposed system is as follows:
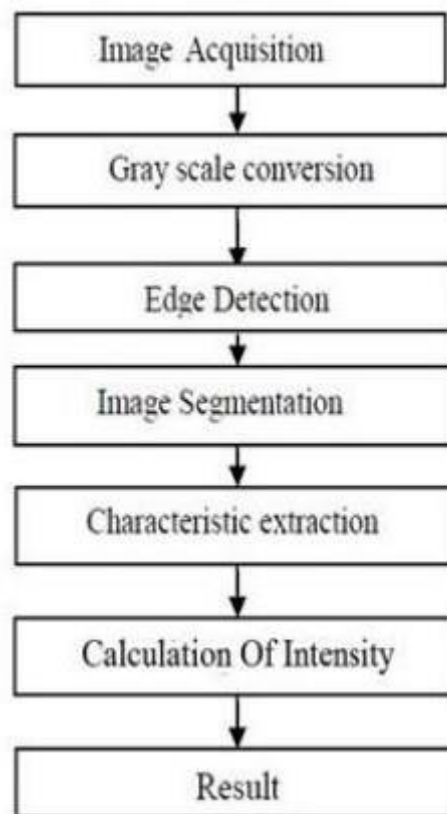

Figure 1. Flow diagram of process.

1) Image acquisition:

The image is kept under ultraviolet light and the image is captured through a simple digital camera

Figure 2. Acquired image.

2) Image preprocessing:

It involves the operations required prior to data analysis and information extraction. Here image resizing is done.

3) Gray scale conversion and edge detection:

The acquired image is obtained as RGB image which is now converted into gray scale image since it carries intensity information. This image is further processed and edges of gray scale images are detected.

Figure 3.Gray scale image

4) Image segmentation:

It's the process of dividing image into multiple parts by cropping it. Segmentation is the process of partitioning a digital image into multiple segments. It is typically used to distinguish objects from backgrounds. Here edge based segmentation is performed on the image. Based on the binary images processed by the morphological transformations, we need to segment the small objects, the digits on the serial numbers, from the large banknote images.

5) Feature extraction:

Now the features are extracted using edge based segmentation.

Figure 4. Identification mark

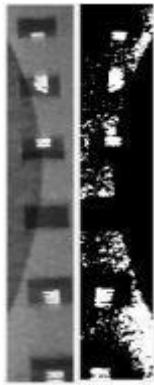Figure 5. Edge based segmentation of Mahatma Gandhi portrait.

Figure 6.Edge based segmentation of security thread.

Figure 7. Edge based segmentation of serial number

6) Now the process of calculation of intensity of each extracted feature is done. If the calculated intensity is greater than the threshold of 70%, then it is classified as original note otherwise it is considered as fake one.

7) The final decision depends upon the intensities of all extracted features.
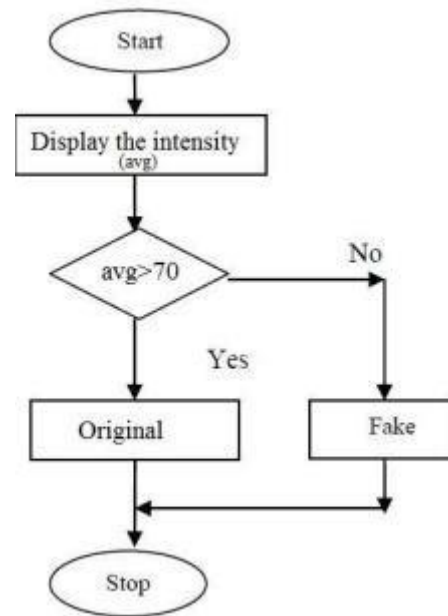

Figure 8. Flow chart for decision making

Experimental results

The results are shown in a GUI made in MATLAB which shows extracted features like security thread and serial number

Figure 9. Testing a 500 denomination note.

Intensities of all remaining features were also calculated for different notes of 500 and 2000.

Features	Intensity
Serial number	93%
Security thread	82%
Mahatma Gandhi portrait	83%
Identification mark	80%

From the above results it was observed clearly that an original currency note's extracted features displays minimum intensity of 70%, it is seen that the 500-2 note displays intensity less than 75% for some features hence it is considered as fake note.

Conclusion

The fake currency detection using image processing was implemented on MATLAB. Features of currency note like serial number, security thread, Identification mark, Mahatma Gandhi portrait were extracted. The process starts from image acquisition to calculation of intensity of each extracted feature. The system is capable of extracting features even if the note has scribbles on it. The algorithm processed here works suitably for the newly introduced 500 and 2000 denomination.. Hardware implementation of the proposed system can also be done using suitable processor so that to increase the speed of detection. An automatic railway ticket booking system can also be proposed which includes currency detection as one of its part.

REFERENCES

[1] Komal Vora, Ami Shah, Jay Mehta, A Review Paper on Currency Recognition System, International Journal of Computer Applications (0975 – 8887) Volume 115 – No. 20, April 2015.

[2] Snehlata Sahu Toran Verma, Identification of Paper Currency Techniques: A Survey, International Journal of Science Technology & Engineering | Volume 2 | Issue 12 | June 2016 ISSN (online): 2349-784X.

[3] G. Trupti Pathrabe, Mrs.Swapnili Karmore, A Novel Approach of Embedded System for Indian Paper Currency Recognition, International Journal of Computer Trends and Technology, May to June Issue 2011, ISSN: 2231- 2803.

[4] Rubeena Mirza, Vinti Nanda, Characteristic Extraction Parameters for Genuine Paper Currency Verification Based on Image Processing, IFRSA International Journal of Computing, Volume 2, Issue 2, April 2012.

[5] Pathrabe T, Bawane N.G, Feature Extraction Parameters for Genuine Paper Currency Recognition & Verification, International Journal of Advanced Engineering Sciences and Technologies, Volume 2, 85-89, 2011.

[6] B.Sai Prasanthi, D. Rajesh Setty , Indian Paper Currency Authentication System using Image processing International Journal of Scientific Research Engineering & Technology (IJSRET), ISSN 2278 – 0882.