International Journal of Research Publication and Reviews

Indian Currency Identification Using Image Processing

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1. A B S T R A C T

The Reserve Bank is the one which issue bank notes in India. Reserve Bank, changes the design of bank notes from time to time. Reserve bank uses several techniques to detect fake currency. Common people faces many problems for the fake currency circulation and also difficult to detect fake currency, suppose that a common people went to a bank to deposit money in bank but only to see that some of the notes are fake, in this case he has to take the blame. As banks will not help that person. Some of the effects that fake currency has on society include a reduction in the value of real money; and inflation due to more fake currency getting circulated in the society or market which disturbs our economy and growth - an some illegal authorities an artificial increase in the money supply,a decrease in the acceptability of paper money and losses. Our aim is to help common man to recognize currency for originality. Proposed system is based on image processing and makes the process automatic and robust. Shape information are used in our algorithm. Original Note Detection Systems are present in banks but are very costly. We are developing an image processing algorithm which will extract the currency features and compare it with features of original note image. This system is cheaper and can provide accuracy on the basics of visual contents of note. So, as an output, people will get information provided the note image is original or duplicate.

Keywords: Currency Identification, Image Processing,

1 Introduction

All economic activities relating to production, distribution, consumption etc. can be motivated by money. Savings and investments can be made in the form of capital information. Thus, money is important in the dynamic society for everything. As our economy is moving towards the development there are many other things which are downsizing it. One of those things is production and usage of forged bank notes. The worst hit of this action is mostly average citizen as fake banknotes have become so deeply embedded in the Indian economy that even bank branches and ATMs are disbursing counterfeit currency. From petrol stations to the local vegetable vendor, everybody is wary of accepting banknotes in denominations of Rs.500 and Rs.1, 000 as a majority of them are almost impossible to tell from genuine banknotes. The usual effect of counterfeit on economy is inflation. The only solution that is presently available for common man to detect counterfeit currency is Fake Note Detector Machine. This machine is mostly available only in banks which is not reachable every time by average citizen. All these scenarios need a kind of solution for common people to judge a forged bank note and to refrain our currency from losing its value. A Digital Image processing is an area characterized by the need for extensive experimental work to establish the validity of proposed solutions to a given problem. It encompasses processes whose inputs and outputs are images encompasses processes that extract attributes from images up to and including the recognition of individual objects. MATLAB is the computational tool of choice for research, development and analysis. The image formats supported by MATLAB are JPEG, PCX, TIFF, PNG etc. Characteristic extraction of images is challenging work in digital image processing. It involves extraction of visible and some invisible features of Indian currency notes. A good characteristic extraction scheme should maintain and enhance those characteristics of the input data which make distinct pattern classes separate from each other. Today, the technology is very fast growing in the word. This increasing of technology the every year government or bank sector faces the problem of fake currency. This problem is very serious issue in India now a day. Similarly the government is also improving day to day but using high printing technology counterfeit circulates the fake banknote in the Indian market. The Reserve Bank of India (RBI) in its latest annual report said that the during 2017-2018, 17,929 pieces of Rs 2,000 notes were detected in 2017-2018 while only 638 counterfeit notes of the same denomination had been detected the year before. In the past, people detecting of counterfeit banknote only manual or a hardware machine which is not easy available in market [3]. The technology of currency detection system basically used for identification and extraction the features of bank note

2 Literature Survey

Over the year a lot of researchers have made several contributions in this field of currency note detection. The researchers have done detection based on security feature, texture, color etc. In this section, we review previous work in currency detection techniques.

Deshpande and Shrivastava [1], the propose a recognition and authentication system using image processing which can be a good for recognition the fake currency note. In this methodology, extract the security features with Multispectral imaging. They are so many feature extract in this process is Mahatma

Gandhi portrait, watermark, RBI watermark , 2000 watermark, electrotype watermark of 2000 denomination note.

Y. Neeraja et.al. [2], describe a fake currency detection using k-nn technique. In this methodology, the feature extraction process by k-nn technology is a robust and versatile classifier that is often used as a benchmark for more complex classifiers such as support vector machines (SVM).

Sawant and More [3], introduce an approach to detect fake note using minimum distance classifier technique. In this paper, the extract an ID mark and latent image and compute the Euclidean distance between the test sample and train sample. The Fourier descriptor is used for the describe the note boundary. The experimental setup is done on rupees 20, 50, 100,500 and 1000.The average success rate achieved is 90.0%.

 K. B. Zende et.al. [4], describe a fake note detection system automatic recognition of Indian currency security feature based on MATLAB system. They are so many step including in this process is feature extraction, image segmentation, edge detection, bit plane slicing and comparison of image. In this paper extract some many feature watermark Detection, Security Thread Detection, checking currency series number, identification mark and sees through register. Here, they propose a GUI platform to check the currency is fake or real. Li Liu et al.

[5], introduce an approach to detect fake coins using digital images. In this paper, represented in the dissimilarity space, which is a vector space constructed by comparing the image with a set of prototypes. To recognized key points they used DOG and SIFT detector.

Ali and Manzoor [6], describe a Recognition System for Pakistani Paper Currency system. In this methodology, the scan an image and classifier used Knn. They are extract the currency feature area, height, width, and aspect ratio. They proposed the system used the different feature of the currency for detection currency and a low cost machine. The experimental setup is done 100 Pakistani currency notes 20 each on rupees Rs. 10, 20, 50, 100, 500 and 1000.The average success rate achieved is 98.57%.

Bhagat and Patil [7], proposed a fast binary descriptor based ob BRIEF, called ORB, Which resistant to noise. In this paper, proposed the system on both side of currency feature. The recognized samples for conditions as illumination changes, rotation and scale change. The experimental setup is done 210 Indian currency notes sample 15 each on rupees Rs. 5, 10, 20, 50, 100, 500 and 1000.The average success rate achieved is 97.14%.

Yanyan Qin et.al. [8], proposed systems provide by SIFT (Scale-Invariant Feature Transform). Initially, the scale spaces were built for the detection of stable extreme points, and then the detected stable extreme points were considered to be feature points which has scale in variance. Secondly, ORB descriptor is used to describe the currency feature points. This finally generated the binary descriptors with scale and rotation in variance. The ORB is 65.28 times faster than SIFT. The experimental setup is done 20 images and achieves accuracy 92.53%

3 Objectives

1. To explore the different security features of the Indian currency Note.
2. To extract the security features with Multi-spectral imaging.
3. To acquire the paper currency with the help of scanner or camera.
4. To crop and segment the acquired image for characteristics extraction.
5. To identify the correct denomination of the currency.
6. To recognize the counterfeit and genuine currency note

4 Proposed system

The system proposed here work on the image of Indian currency note acquired by a digital camera. The method which is applied here is as follows

a. Acquisition of image of Indian currency note by simple digital camera or scanner.

b. Image acquired is RGB image and converted to Grayscale image.

c. Edge detection of whole gray scale image.

d. Now Indian currency features of the paper currency both observe and reverse will be cropped and segmented.

e. After segmentation, feature of Indian currency note are extracted.

f. BF matcher match that database features with test images note then the test note is said as original otherwise fake.
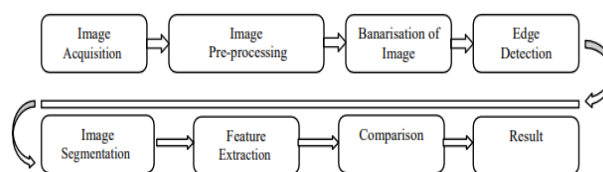
g.

Fig. System Architecture

5 Proposed System

1. Image Acquisition: the acquisition image. In this process, first image by using various ways to acquire image such as with the help of camera or scanner. This part is very impartment for extraction and detection of a currency.

2. Pre-Processing: Image pre-processing is required prior to the main dataset and extraction of information and performs different operation for any currency verification. It includes Image Adjusting: When we get the image from a camera, We reduce the calculation and decrease size of an image. These will also removing the background form the image also helping in reducing the size of the image

3. RGB to Gray-Scale Conversion: The capture image acquired is in RGB colour. This image is heavy and has more noise. Fig 5 shows by converting into gray scale, it reduces the size of the image and also the intensity information which is easy to process instead of processing three components R (Red), G (Green), B (Blue).

4. Edge Detection: Edge detection is a tool in computer vision, particularly in the process of feature extraction and detection, which aim at identifying key points in a digital image. To segment an object from capture image, one needs closed region boundaries. Edge detection is one of the processes in image processing, image analysis, image pattern recognition, and computer vision techniques.

5. Image Segmentation: The image segmentation is the process which is divided a digital image into multiple segments, set of pixel. It is also called the image thresholding which threshold is decided and if value of given pixel is above threshold then is converted into white pixel otherwise converted into black pixel.

6. Feature Extraction: Feature extraction process very important role in image processing and computer vision. In computer vision, feature extraction is the special form of dimensionality reduction. It is method of capturing image for retrieval and indexing. The aim is to extract and identify the unique feature of each Indian denomination under various challenging condition such as rough note, fold condition also under different background.
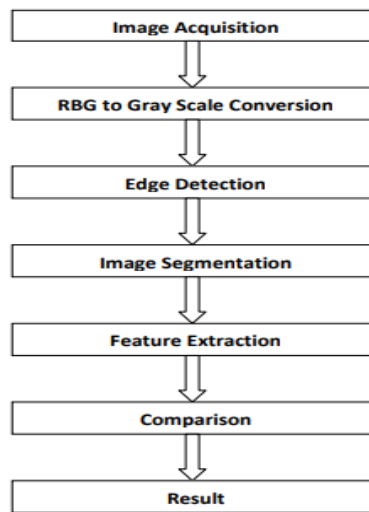

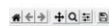Fig : Block diagram of Indian Currency Detection System
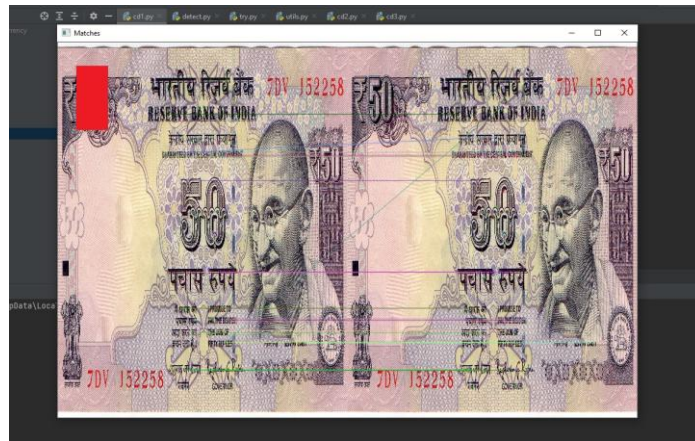
6 Results

Fig. System Results

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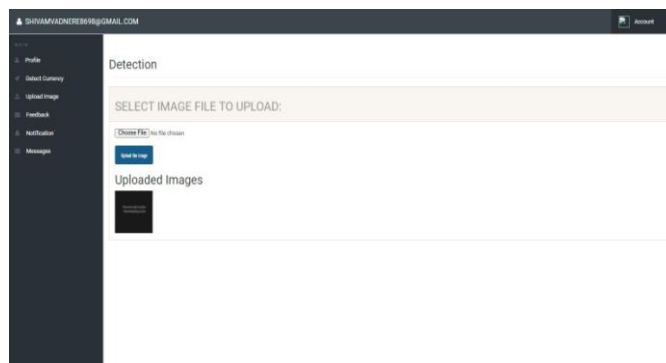Fig. System Results

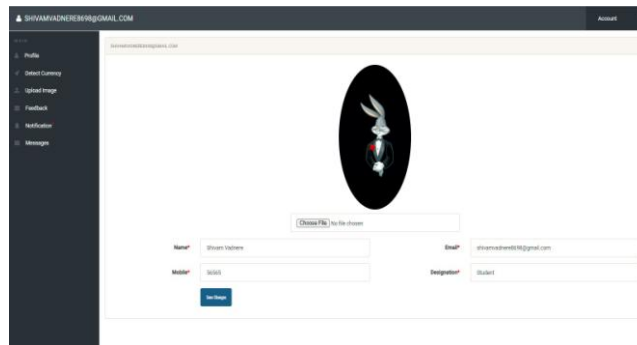

Fig. System Results

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7 Conclusion

In this system, the authentication of currency is described by applying image processing. Basically some features are extracted including various domination parts of note (like identification marks of the currency).The features are extracted using image based segmentation using template matching and works well in the whole process with less computation time. The complete methodology works for 100, 500 and 1000 currency notes. The method is very simple and easy to implement. This technique is very adaptive to implement in real time world. The process begins from image acquisition and end at comparison of features. This project will be helpful to those people who don't have any knowledge about currency , so basically this project will be developed by taking common man issues of currency related problem.

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