

# Indian Currency Identification Using Image Processing: A Review Paper

Gurunath Vilas Vadnere<sup>1</sup>, Shalaka Anil Khilari<sup>2</sup>, Harshali Prakash Sonawane<sup>3</sup>, Pooja sharad Sanap<sup>4</sup>,  
Aashutosh Maruti Koneri<sup>5</sup>, Mrs. Jayashree Shinde<sup>6</sup>  
<sup>1,2,3,4,5</sup> *Sir Vishweswaraya Institute of Technology*  
<sup>6</sup>*Guide, Sir Vishweswaraya Institute of Technology*

**Abstract** - A currency note is a type of a negotiable instrument made by a bank, payable to the bearer on demand. The Indian Rupee is the official currency of the Republic of India. Counterfeit money is imitation currency produced without the legal authorization of the state or government. Counterfeit notes are one of the biggest problems occurring in cash transactions. This has led to the escalation of corruption hindering country's growth. Because of the rapid advancements in imaging, scanning, and printing technologies it is very easy for a person to create counterfeit currency notes with use of advanced software and hardware tools. Detecting the counterfeit notes manually become time consuming and untidy process hence there is need of automatic technique with currency recognition process can be efficiently done. This paper made an effort to explore the various security features of the highest denomination of 2000 with multispectral imaging. Counterfeit of currency of denomination 2000 will be a very difficult task because as many security features are embedded in the newly introduced currency notes which makes the currency of highest denomination more secure.

## I.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 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 easily available in market [3]. The technology of currency detection system basically used for identification and extraction the features of bank note.

## II.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 features 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 steps including in this process is feature extraction, image segmentation, edge detection, bit plane slicing and comparison of image. In this paper extract some many features 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%

## III.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

#### IV. 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 is extracted.
- f. BF matchers match that database features with test images note then the test note is said as original otherwise fake.

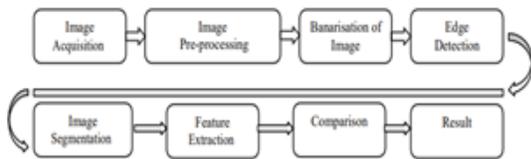


Fig. System Architecture

#### V. 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 important 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 be removing the background from 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 pixels. 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.

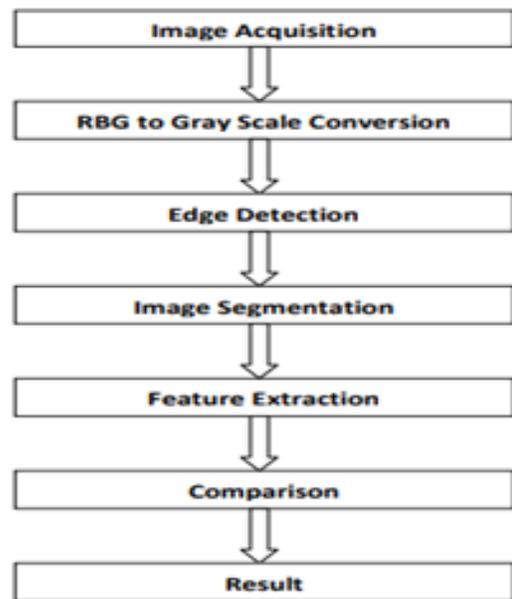


Fig: Block diagram of Indian Currency Detection System

## VI.CONCLUSION

This paper proposes a novel method for recognition and authentication of Indian paper currency note using Image processing. The paper also includes the study of detailed information about the various distinct security features that are embedded in the original Indian currency note of the denominational value 2000 using multispectral imaging. This study also exposes the features that do not appear in the photocopy and scanned currency notes so as to offer a better knowledge and idea about variance in the genuine and fake currency. The work will surely be very useful for minimizing the counterfeit currency. Every individual must have knowledge about these security features in order to prevent the counterfeiting of currency notes. In future this work also extended for different newly introduced denominations.

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