

# Counterfeit Currency Detection

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**Abstract**—Counterfeit currency is a burning question throughout the world. The counterfeiters are becoming harder to track down because of their rapid adoption of and adaptation with highly advanced technology. Detecting fake notes manually becomes tedious and untidy process hence there is need of automation techniques with which currency detection process can be efficiently done. The process of identification is done by extracting the features such as security thread and watermark of the numeral of the given Indian currency and comparing it with the extracted features of the original currency with the help of image processing techniques like Canny edge detection, Gaussian Blur. There are many ways used to detect forgeries however still very dependent on the presence of a machine and equipment that are sometimes less effective and need more time but with our proposed model we can detect the originality of our currency paper quickly with the help of a scanner or an image capturing device.

**Index Terms**—Digital Image Processing, Fake currency detection, Python, Open CV, Segmentation

## I. INTRODUCTION

Technology is evolving at a rapid pace. Many researchers have been encouraged to develop robust and efficient automatic currency identification machine. The development of color printing technology has expanded the rate of fake currency note printing and replicating the notes on a very extensive scale. Couple of years ago, the printing could be done in a print house, but now anyone can replicate a currency note with maximum accuracy using a simple laser printer. Result of which the issue of duplicate notes instead of the authentic ones has been increased very largely. India has been unfortunately doomed with problems like fraud, corruption, black money and counterfeit of currency notes is also a big problem to it. This leads to the design of a system that recognizes the counterfeit currency note in a less time and in a more well organized manner. The technology of currency recognition system basically aims for identifying and extracting visible features of currency notes. The proposed system gives an approach to confirm the Indian currency notes. Verification of currency notes is done by the concepts of image processing. Here we have tried to extract features of Indian currency notes to find whether it is counterfeit or not.

### A. Literature Survey

Based on strong literature survey, image processing can be considered as the most widespread and effective technique of currency detection.

Denomination of currency [1] is known by identification mark. Next generation intrusion detection expert [2] system is used in this paper by using the real time and batch technique. Large volume of fake money will cause many problems. Using machines it is easy to recognize fake currency [3]. Every

year RBI (Reserve Bank of India) face the fake money or destroyed money. Various methods [4] like water marking, optically variable ink, florescence, etc. are used to detect fake currency in this paper. In this system, various two components of two images are combined together to find the variation among the images. Image acquisition, gray scale conversion, edge detection, feature extraction, image segmentation [5] and comparison of images are the methods used in this approach to detect the fake currency. Feature extraction by edge based segmentation using sobel operator [6] is used in this paper for design and implementation. The image is acquired and the acquired image is converted into grey scale by pixel value [7]. The image is sub divided into object or region [8] by image segmentation. Security features [9] of Indian currency are used in this paper.

## II. METHODOLOGY

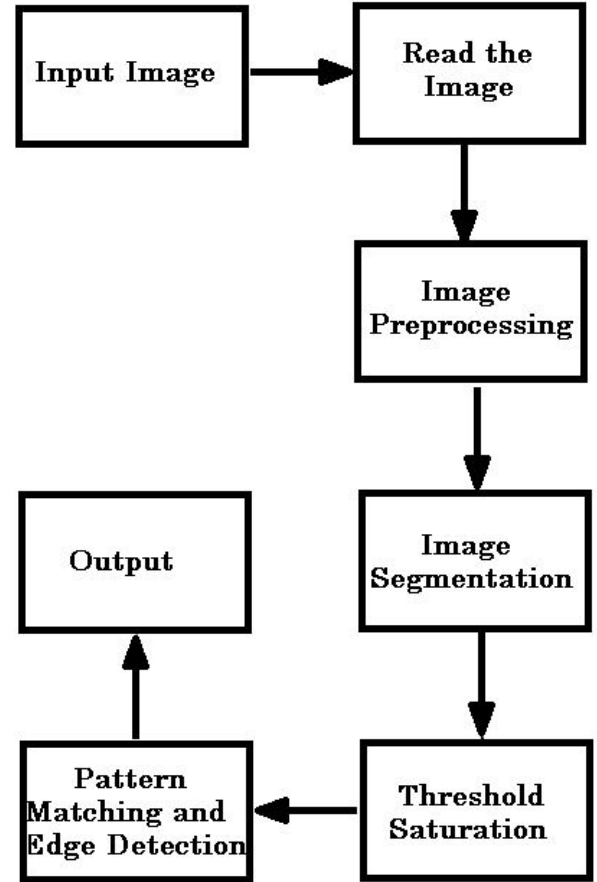


Fig. 1. Significant steps in the fake note identification system

### A. Read Image

The image is captured using the camera/scanner and the image is stored as data set for reference. The acquisition will contain all the attributes of the image. The acquired image is later converted into the respective RGB histograms.

### B. Image Segmentation

Image Segmentation is one of the important parts to process image data. It aims to divide an image into parts that have a strong correlation with objects. This is followed by resizing of the image.

### C. Image Conversion

The image is converted into grey scale based on the pixel values. The RGB value is converted as pixel and the pixel value is converted into grey scale. Then the grey image is converted into HSV image.

### D. Threshold Saturation

Here we adjust the value of Hue, Saturation and Value (HSV) using trackbars to get the desired feature highlighted.

### E. Image Masking

Obtaining the final image by combining Mask with the Original Image of the currency.

### F. Final Cleanup

In this the unwanted regions of the images are removed from the image.

### G. Features



Fig. 2. Parameters of Rs.100 note

1) *Watermark of the Numeral*: As the watermark of the numeral is in a vertical format, so it is rotated and then by using OCR image is converted to text conversion.

2) *Security Thread*: The image is converted into grey scale then to Gaussian blur to reduce noise from the image. The blurred image is now converted into canny for edge detection. Finally, we get the contours.

### H. Count Black Lines

For real image the black line should be 1. Other than 1 are considered as fake currency. The number of lines in both the images are calculated by the use of parameters. If it is 1 it is real otherwise it is fake.

## III. RESULTS

### A. Security Thread

In Security Thread: If the number of contours detected is less than equal to 1 then the currency is real. Else it is fake.



Fig. 3. Image of Real Note — Continuous strip detected



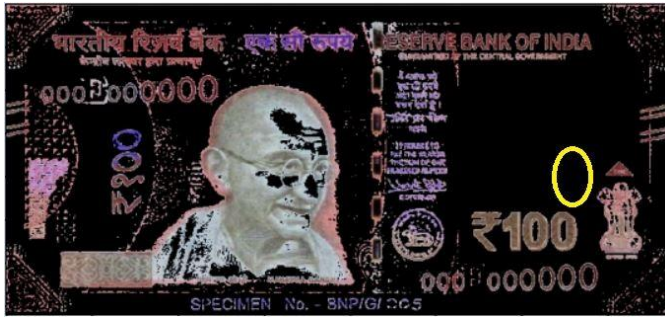
Fig. 4. Image of Fake Note — Segments of strip detected

### B. Watermark of the Numeral

In Watermark of Numeral: If the output detected using OCR is the same as that of the currency then it is real. Otherwise, it is fake.



Fig. 5. Image of Real Note — Numeral detected



#### IV. CONCLUSION

Currency use is a necessity for survival and hence it is always necessary to keep in track of its originality. Paper currencies are used much more in India and hence a system to detect the fake currency is needed. As the new currencies are used in the market, the proposed system seems to be useful to detect the currency to be genuine or not. It also shows where the differences are in the currencies instead of simply displaying the result. This system can be further implemented for foreign currencies like Dollars, Euros, Taka, etc. as a future scope. Finally, we compared Real and Fake images we find whether the currency is original or duplicate.

#### V. REFERENCES

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