

# Counterfeit Currency Recognition and Detection using Image Processing



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## ABSTRACT

The Concept of Counterfeit currency or fake currency is as old as the concept of money itself. The counterfeit currency is one of the main reasons for the economic losses to the countries in the world. This developed the need to find a better solution, utilizable by common people to check the genuineness of the currency. With this thesis, we propose an android application that would distinguish the FCIN (Fake Currency Indian Note) from the original ones. Android devices are popular and are mostly portable, hence providing the handy feature of carrying the application with oneself.

**Keywords:** Android, FCIN (Fake Currency Indian Note), Counterfeit Currency, Image Processing, Gray Scale, HSV (Hue Saturation Value), OCR (Optical Character Recognition), Segmentation.

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## I. INTRODUCTION

Paper currency note is one of the most prevailed medium of daily transactions in many or almost all the countries in the world. Every country in the world has an authority that issues currency. In India, RBI (Reserve Bank of India) is the whole and sole and the only authority that issues currency denominations. There are paper currency notes of Rs.1, Rs.2, Rs.5, Rs.10, Rs.20, Rs.50, Rs.100, Rs.500 and Rs.1000 respectively. Each Indian Currency Note has its specific dominant color and special common features prescribed or specified by RBI.

## II. LITERATURE SURVEY

### Counterfeit Currency Detection Technique using Image Processing, Polarization Principle and Holographic Technique. (IEEE).

Here, in this paper, the author proposes the detection of counterfeit currency using spin coating, cellulose confirmation, polarization, holographic pattern and detection. The whole process is automated using NI-

IMAQ (National Instruments-Image Acquisition). Also, author proposes installing of a unique hologram for each denomination, thus making it easier to identify the denomination's genuineness.

### Automatic Indian Currency Denomination Recognition System based On Artificial Neural Network. (IEEE)

Automatic detection and recognition of Indian currency is a trending research topic and has gained a lot of attention since the past decade. With this paper, the author proposes the recognition of Indian Currency using Image Processing. The methodology described goes as Follows- Extraction of dominant color, aspect ratio & then the image processing techniques such as edge detection, segmentation, dilation, erosion, cropping, Color space Conversion, etc. are carried out. Also, the author proposes the extraction & recognition of each unique ID-Mark using Fourier Descriptor and Artificial Neural Network Respectively. The dominant color, threshold values and aspect ratio for each denomination are as follows:

Denomination	Dominant Color	Threshold Value of Aspect Ratio		
		Min	Max	Std
Rs.20	RED	0.40	0.43	0.42
Rs.50	RED(P INK)	0.47	0.50	0.49
Rs.100	BLUE	0.45	0.48	0.46
Rs.500	GREEN	0.42	0.44	0.43
Rs.1000	RED	0.39	0.42	0.41

### An automatic recognition of fake Indian currency note using MATLAB (IJESIT)

Here an automation system to recognize the Indian currency note is proposed. the author discusses the MATLAB algorithm and other image processing techniques such as feature extraction, its color-space and etc. this paper discuses and embedded system application where the embedded system is connected to a computer using serial interface and the output is provided through the device camera to the computer system and output is generated on the LCD panel of the embedded system.

### Review of various image processing techniques for currency note authentication (IJCERT)

In this application author proposes a system for currency note authentication using Open CV and use SIFT technique for feature matching. Author also discusses the short coming in the exiting MATLAB system and proposes used and Map-reduce platform using Hadoop as MATLAB does not provides open source platform using and cloud where internet connectivity is needed throughout the process.

### III. FEATURES OF INDIAN CURRENCY NOTE

**1) See Through Register:** It is small floral design printed on the both face of the note in the middle of the vertical band next to water mark has an accurate back to back. the design appears as a floral when see against light.

**2) Watermark:** - Each Indian currency note contains a portrait of Mahatma Gandhi with a light and shade effect and multidimensional lines in the watermark.

**3) Optically Variable Ink:** The numeral 1000 and 500 on the obverse and Rs1000 and Rs 500 respectively is printed in optically variable ink viz, color-shifting ink.

**4) Fluorescence:** Number panels are printed in Fluorescence ink. They also have optical fibers.

**5) Security Thread:** The security thread bears the inscription Bharat (in Hindi) and RBI (in English). the security thread appears to the left of mahatma portrait.

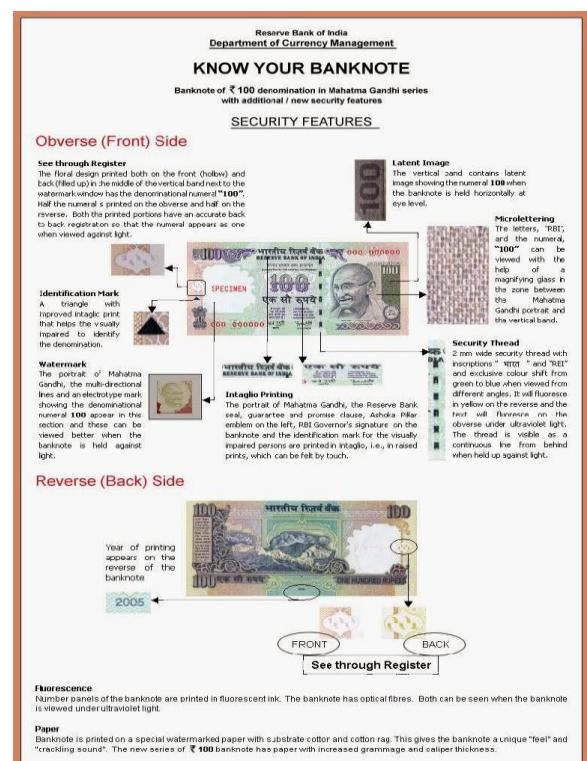
**6) Intaglio Print:** - The portrait of Mahatma Gandhi, Reserve bank seal, guarantee and promise clause Asoka

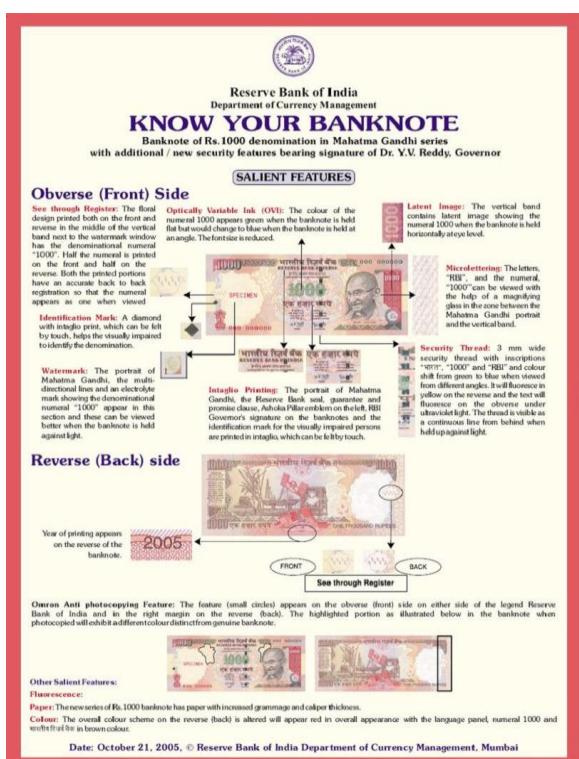
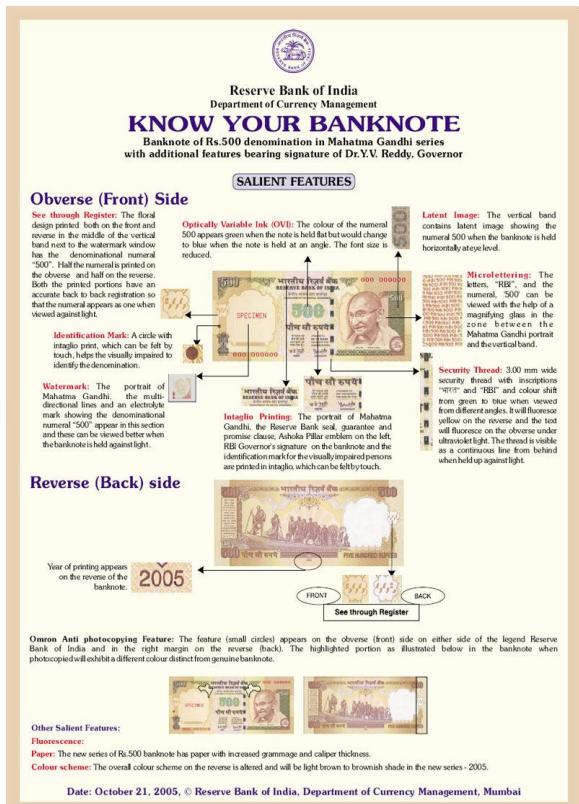
pillar governor's signature all are printed in intaglio or raised prints.

**7) Micro lettering:** - This feature appears between the vertical band and Mahatma Gandhi portrait. it always contains the word 'RBI' in Rs.5 and Rs.10 note. the higher denominational notes also contain denominational values of the notes in micro letters. This can be seen using a magnifying glass.

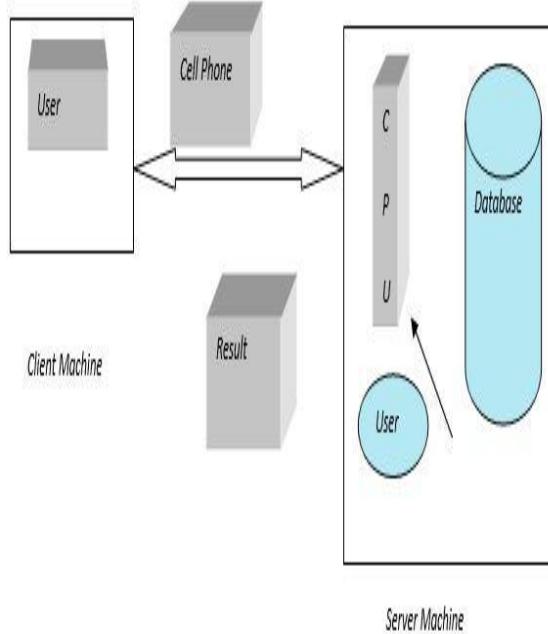
**8) ID-Mark:** -Each denomination notes, ranging from Rs.20 to Rs.1000 has unique shape ID-Mark. This feature is for the visually impaired population to recognition the denomination.

Denomination	ID-Mark Shape
Rs.20	Vertical Rectangle
Rs.50	Square
Rs.100	Triangle
Rs.500	Circle
Rs.1000	Diamond

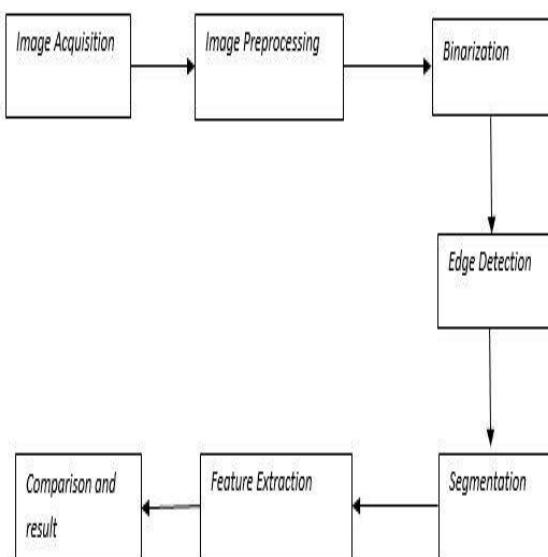




#### IV. PROPOSED SYSTEM ARCHITECTURE



#### Methodology:



#### Equations:

Let S be the solution of the given problem statement.

S={s, e, i, l, p, o, x, fs, success, failure, fm}

Where,

l=login ID

p=password

s = initial state

e = end state

i = input

{Suspect note image }

x = upload the image to server  
 o = output from server  
 {Detect the note is original or not}  
 fm = main function  
 {Main function is to compare the suspect note image with original note image}  
 fs = set of function {f1, f2, f3, f4, f5, f6, f7}  
 Where,  
 f1 = {pre-processing of suspect note}  
 f2 = {binarization of suspect note image}  
 f3 = {edge detection of suspect note image}  
 f4 = {segmentation of image}  
 f5 = {feature extraction of suspect note}  
 f6 = {Convert security thread of suspect note into grey scale}  
 f7 = {Verify the serial no. of suspect note with valid list}  
 Success = {It verify and compare all the parameters if all the parameters is satisfy then the suspect note is original}  
 o= f1Uf2Uf3Uf4Uf5Uf6Uf7  
 Failure = {network error , image not captured clearly, no internet connection then it goes into failure state}

## V. CONCLUSION

After having a look over all methods used for currency detection, it is of utmost need that a standalone system should be developed which would facilitate portability and easier access. This thesis thus proposes an android application for the same.

Future work can be carried out by applying heuristic approach to the serial numbers. Here for serial number verification, a prototype database too can be used thus adding one more parameter to the existing research.

## REFERENCES

- 1.Counterfeit Currency Detection Technique using Image Processing, Polarization Principle and Holographic Technique. (IEEE)
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