

A Case Study Of Fake Indian Currency Recognition

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Abstract

In this paper, I intend to design the system for the recognition of currency notes of India and find out its legitimacy. The necessity for a currency recognition system is more relevant due to the various technologies and machinery used to counterfeit banknotes. We can identify whether the currency note is legitimate or not by various physical means but practically we can't check the legitimacy of various notes. Hence, there is a requirement of a system by which we can determine the legitimacy of currency notes. This system will prove to be very useful in banks and many other places where cash flow is continuous.

Keywords:- Fake Currency, Currency Identification, Image Processing, Currency Verification

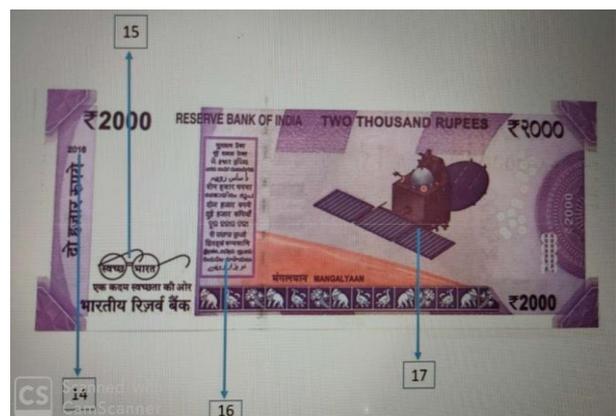
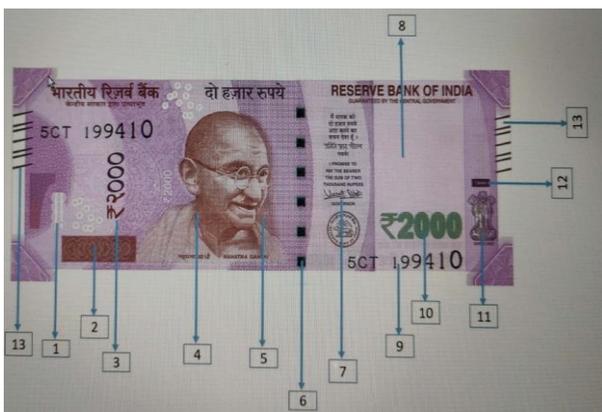
I. INTRODUCTION

Currency is the lifeline of people and it is used everywhere to exchange goods and services. Due to difficulty in transferring Coin currencies all around, the use of paper currency has increased considerably and due to their increased use, people have started to make copies of the original currency. The effect of counterfeit is Inflation on the economy. The proposed system aims to uncover the legitimacy of the currency note of India and decide whether it is legitimate or not. RBI is the only authorized organization to issue currency notes in India. The value of a currency is increasing rapidly and Rs 500 & Rs 2000 are among the maximum currency value available in the market. Counterfeit of currency notes has a direct impact on the life of common people.

The fake currency recognition system is designed specifically for finding out the legitimacy of currency notes of India. The purpose of the currency recognition system is to help people to recognize counterfeit notes and also reduce human effort[1]. This system has various advantages such as accuracy, simplicity; processing speed, etc. Digital Image processing is the solution to fake currency problems.

Features of Indian Currency:-

- Rs 2000 Note:-
 - > Base color:- Magneta
 - > Dimensions :- 66 mm X 166mm



FrontSide

BackSide

Front Side:-

1. See-through register
2. Latent image
3. The currency value in Devnagari
4. Picture of Mahatma Gandhi
5. Micro letters 'RBI' and '2000' on the left side of the banknote.
6. Windowed security thread with engraving & color change to blue from green upon tilting the note.
7. RBI emblem & Governor's signature along with promise clause
8. 2000 logo and portrait of Mahatma Gandhi
9. Increasing size on Top –left & Bottom Right on Number Panel with Numerals
10. Currency value with 2000 in color changing ink (green to blue) on the bottom right.
11. Ashoka Pillar emblem at right.
12. On the right, there is a horizontal rectangle with 2000 in raised print
13. 7 angular bleed lines in raised print on both sides(left &right)

Back Side:-

14. Note's Printing year
15. Logo of Swachh Bharat and slogan
16. Language panel.
17. Mangalyan

II. LITERATURE SURVEY

Since counterfeiting the currency notes is an important issue which has an adverse effect on our dynamic lifestyle, various researches and systems have been conducted and developed in the domain of fake currency recognition. The recognition has been done based on the factors such as color, textures, security features etc. There exist numerous systems for detecting counterfeit currency of India using various techniques. Some of the techniques follow:

1. Commonly used methods
2. Digital Image Processing
3. MATLAB
4. Currency sorting machine
- :
- :
- & many

In **Digital Image processing**, a picture of the currency note is captured through a camera. Image processing is done on the captured image using various concepts such as image segmentation, image edge formation, feature extraction [5].

In **MATLAB**, the RGB components of the two images are compared :

- a) RGB component of original Indian currency note, i.e. (r_a, g_a, b_a)
- b) RGB component of note to be tested , i.e. (r_b, g_b, b_b)

Then a new image with components as (r_a, g_b, b_a) or (r_b, g_a, b_a) or (b_b, g_a, b_a) constructed. (r_a, g_b, b_a) is most preferred because our eye is sensitive to green and mostly our images contain large green components. So that, image which will be obtained as output is much easier to detect counterfeit note more efficiently.

III PROPOSE SYSTEM

CURRENCY:-

- The official currency of the Indian Republic is the Indian rupee. Its issuance is managed and controlled by the RBI. RBI manages and controls Indian currency and thus, plays a vital role in currency management. In India currency is being currently issued having values corresponding to Rs 10, 20, 50, 100, 200, 500, 2000.

Camera:-

- A camera is a perceptible device used for recording and capturing the pictures. The camera can be called a remote sensing device due to its ability to sense objects without any contact with them. Its functioning is quite similar to the human eye's functioning. A camera functions with the visible spectrum's light or with other sections of the electromagnetic spectrum.

PC:-

- Personal Computer
- A personal computer (PC) is a computer that can be used for several purposes or function and their cost, size, capabilities make it viable for personal use.
- On the personal computer, MATLAB software needs to be installed which is used for image processing.

PCA Algorithm:-

- Principal component analysis
- It is a statistical procedure that converts a set of observations of possibly correlated variables into a set of values of linearly uncorrelated variables called principal components using orthogonal transformation.

$$A = \min(B, C)$$

where

- A = No. Of distinct principal components
- B = No. Of Original variables
- C = No. Of observations – 1
- min() returns the smaller value

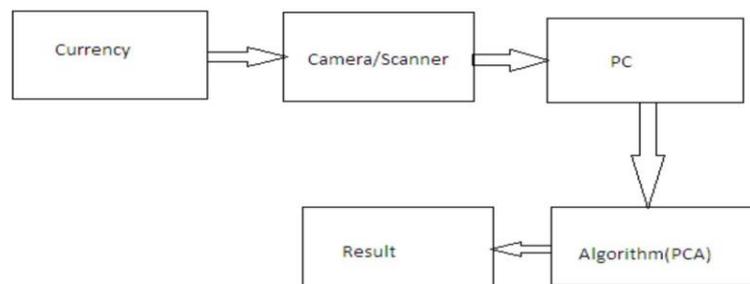


Fig: Block Diagram [3]

IV ANALYSIS

Image Acquisition:-

- Here, the image of the note to be checked is provided as input. The image of the note is acquired and its quality should not be adjusted for the high accuracy. The format of the image given as input should be JPEG.

Pre-processing:-

- Unwanted deformation is inhibited & intensifies few image features which is of the great importance of further processing.
- include smoothening & adjusting of image.
- achieve color detection[9]

Grey Scale Conversion:-

- Received Image is of RGB (Red,Green,Blue)color, which is changed to grayscale because it only gets intensity facts which are relatively easier to exercise as compared to exercising of RGB components.

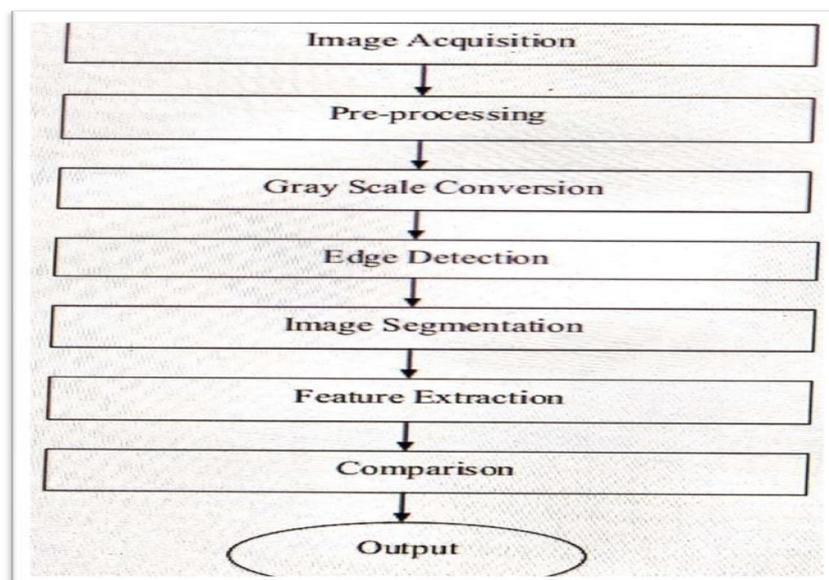
Edge detection:-

- used to withdraw object boundaries in the image.
- inspect and detect immunity irregularity to withdraw features of paper currency.
- a simple tool specifically in the feature detection & extraction area[6].

Image Segmentation:-

- purpose:- to divide an image into different segments to make the survey easy and expressive.
- image is split into portions depending upon the problem, the segmentation is done.

18. Fig: Flow Chart of operation [2][8]



Feature Extraction:-

- The process to capture visual image content for convalescence and recording.
- make a straightforward amount of assets needed to narrate a set of data [7].

- feature extraction algorithms extract the features of a currency.
- It can use various methods such as edge detection, scale-invariant feature and more.

Comparison:-

- Since the image is inspected using various techniques, it is compared with data set of features of a currency. Matched images are assigned as legitimate and the image which will not match the criteria is fake.

Output:-

- displayed on the screen of the PC.
- The output is determining whether the currency to be tested is legitimate or not.

EXPECTED RESULTS:-

In this method, image acquisition is processed by the use of a camera and the acquired picture is sent to the processing unit as the test image. After that, we select a given button for the respective currency. Later the images are changed to greyscale, segmented, cropped, resized images then contrast between cropped & resized image with the images already stored in the database is done. Then the outcome is unveiled on screen.

IV. CONCLUSION:-

In this Case study the proposed system, identification of counterfeit currency notes of India is done by the use of image processing technique and PCA is used for the recognition purpose specifically. It is a low budget system so that every people can afford it. The system is used to find the legitimacy of currency notes of India having a value of 100, 500 & 2000. The system yielded an appropriate and desired results. The most important aspect is that it is relatively very quick and simple.

Future Work:-

The app-based system can be planned to acquire appropriate outcomes to check whether the image of currency is legitimate or not.

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