

Counterfeit Currency Recognition Using SVM With Note to Coin Exchanger

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Abstract- Every year RBI (Reserve bank of India) faces problem of Counterfeit Currency notes or destroyed notes. So Fake Currency Recognition in India got great importance. Fake notes in India are of Rs.100, 500 and 1000 are being flooded into the system. In order to deal with such problems, an automated recognition of currency notes is introduced with the help of feature extraction. By extracting sufficient monetary characteristics from the currency image, it is possible to find out counterfeit currency and it very is essential for accuracy and robustness of the automated system. Now a day's requirement of coins is increasing at places like bus stand, railway station, malls and parks. The main motive behind the project is to design an efficient and simple machine which will fulfill the need of coins for transactions so that people will not face problem of coins. This project is to provide coins for genuine note, for this purpose we have developed mechanical coin dispensing model in which camera takes picture of note. After that it find's out its value using image processing technique and then according to the value equivalent number of coins is dispensed.

Keywords- Counterfeit Note, Feature Extraction, SVM, Note to Coin Exchanger.

I. INTRODUCTION

Automatic method for detection of fake currency note is very important in every country. The Reserve bank of India estimates that there is at least Rs.2 trillion of fake rupees note in circulation throughout India. The bank staffs are specially trained to detect counterfeit notes but problem begins once such notes are infiltrated into the market and circulated through common people. Even receiving counterfeit notes from ATM counters have also been reported at some places. With development of modern banking services, automatic methods for currency recognition become important in many applications such as in ATM and Automatic Goods Seller Machines. In this project we have made fake currency note detection technique using MATLAB and feature extraction with other applications of image processing. MATLAB is the computational tool of choice for research, development and analysis. Characteristic extraction of images is challenging work in digital image processing. It involves extraction of some invisible; visible and features of Indian currency notes [1]. In this project setup, note is placed in front of camera to check whether it is fake or genuine. Camera takes the pictures of notes and it is analyzed by MATLAB program installed on computer and checks Indian currency notes. The project is meant to check Indian currency notes of 10, 20, 50, 100, 500 and 1000 rupees. If the note is genuine, then respective message is appeared on the screen and vice-versa. After that, according to the user input equivalent number of coins will dispense.

1.1 Commonly used methods to detect counterfeit currency

1. Watermark

In Indian banknotes contain the Mahatma Gandhi watermark with shade effect and multi-directional lines in the watermark window.

2. Latent Image

On the obverse side of Rs.20, Rs.50, Rs.100, Rs.500 and Rs.1000 notes, a vertical band on the right side of the Mahatma Gandhi's portrait contains a latent image showing the respective denominational value in numeral. The latent image is perceptible only when the note is held horizontally at eye level.



Figure 1. Security Features of Indian Banknote

3. Microlettering

This feature appears between the vertical band and Mahatma Gandhi portrait. It contains the word 'RBI' in Rs.10 and Rs.5. The notes of Rs.20 and above also contain the denominational value of the notes in micro letters. All these features can be seen well under a magnifying glass.

4. Optically Variable Ink

This is a new security feature incorporated in the Rs.500 and Rs.1000 notes with revised color scheme introduced in November 2000. The numeral 500 and 1000 on the obverse of Rs.500 and Rs.1000 notes respectively is printed in optically variable ink. The color of the numeral 500 and 1000 appears green when the note is held flat but would change to blue when the note is held at an angle.

5. See through Register

The small floral design printed both on the front (hollow) and back (filled up) of the note in the middle of the vertical band next to the Watermark has an accurate back to back registration. The design is appeared as one floral design when seen against the light.

6. Serial Numbers

Every Indian banknote has its own serial number and it is more important to check whether the number is wrong or repeated.

7. Security thread

The Rs.100 and Rs.500 notes have a security thread with similar visible features and inscription "Bharat", and "RBI". When held against the light, the security thread on Rs.100, Rs.500 and Rs.1000 can be seen on continuous line. The Rs.50, Rs.20, Rs.10 and Rs.5 notes are

contain a readable, fully embedded windowed security thread with the inscription “Bharat”, and “RBI”. The security thread appears to the left of the Mahatma's portrait.

8. Intaglio printing

The Reserve Bank seal, the portrait of Mahatma Gandhi, guarantee and promise clause, Ashoka Pillar logo on the left, RBI Governor's signature are printed in intaglio. It is raised prints, which can be felt by touch, in Rs.1000, Rs500, Rs.100, Rs.50 and Rs.20 notes.

9. Identification mark-

Each Indian banknote has a unique mark of it. This special features have different shapes for various denominations (Rs.20-Rectangale, Rs.50-Square, Rs100-Triangale, 500-Circal, Rs.1000-Diamond) and helps the visually impaired to identify the denomination.

II. DESIGN FLOW OF AUTOMATIC RECOGNITION OF GENUINE AND COUNTERFEIT NOTES

The below fig 2 shows step-by-step process of automatic recognition of counterfeit currency system.

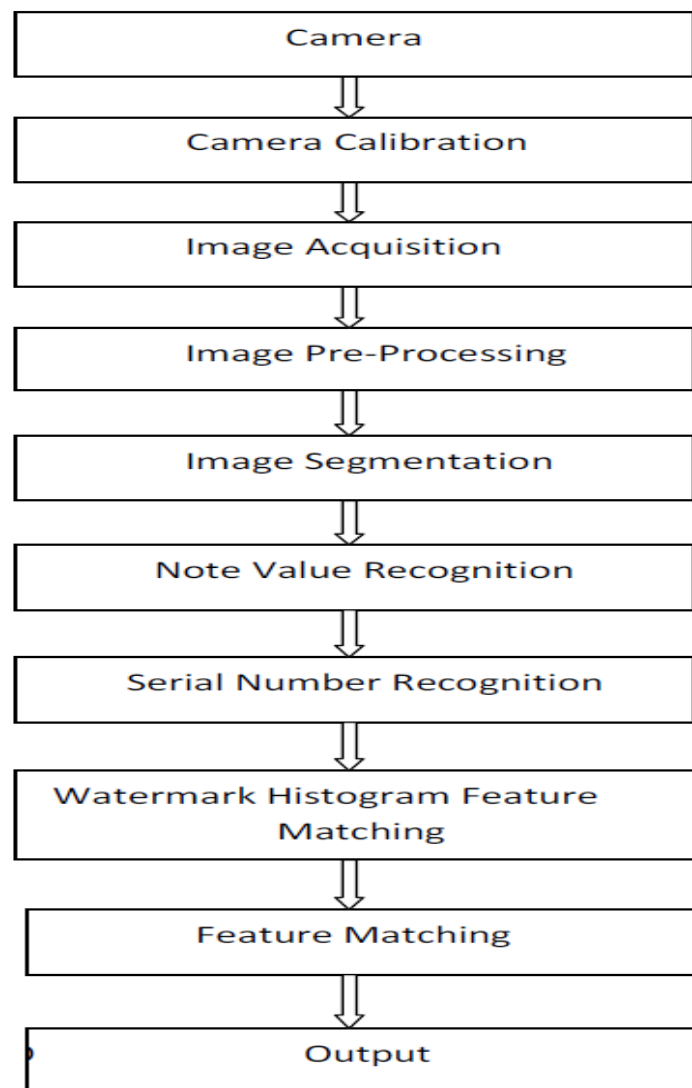


Figure 2. Design flow of automatic recognition of counterfeit currency system

III. PROPOSED WORK

Figure 3 shows LPC 2138 processor with mechanical structure which has motors and relays to perform requested task. Pc with matlab is provided with the information that note placed by the user is genuine or fake note. For that acquired note image is to be processed from camera. This note image divides into different parts which is known as segmentation. Symbol, Serial number & Watermark segment is used for further processing. After segmentation different regions are selected for processing to extract the features of notes. Extracting the features of middle region and using symbol recognition note value is determined. There is watermark of Mahatma Gandhi on currency note and it is identified after segmentation. Watermark histogram features are extracted to match the watermark with Gandhi's portrait. If note is placed by user is genuine, then respective message is appeared on the screen and vice-versa. After that according to the requirement of Coin, user can give the input through matlab. USB to serial converter is used for user to machine communication. LPC 2138 processor is used to control overall working of coin dispensing machine. Processor controls all motor operation and it communicates with MATLAB running on computer.

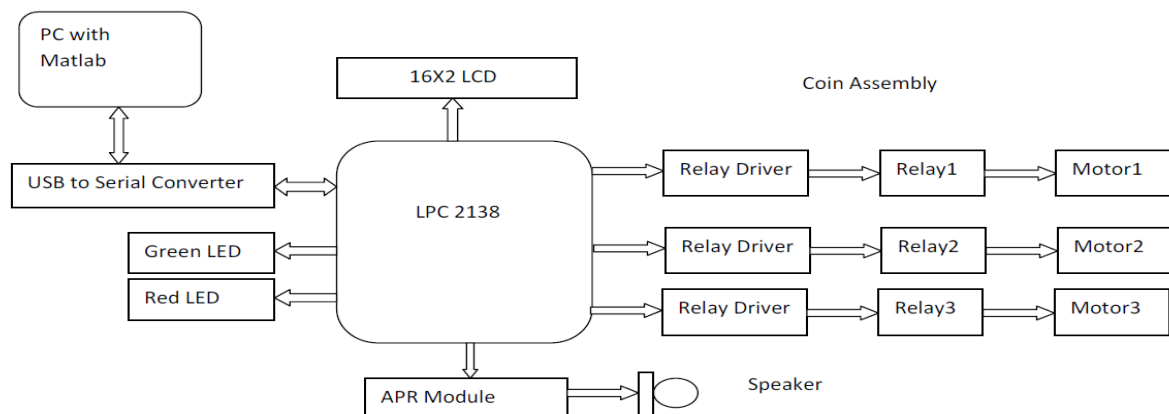


Figure 3. Block Diagram of Note to Coin Exchanger with Counterfeit Note Detection

There are 3 buttons of 5 rupee coins, 10 Rupees coins and mix coins. Now the user can select the combination in the form of 5's and 10's. Coin Container unit consists of relays to drive the motors and motor will let out the coins to the user. Incase of mix coins, the Processor will check for availability of coins in the coin container and then as per the wants of the user from the buttons the mix coins will be let out to the user. If the coins as per the need of the user are not present in the coin container then a message will be displayed on the LCD "INSUFFICIENT COINS".

VI. EXPERIMENTAL RESULT

In this section, we test the performance of the proposed method on a set of some Indian banknotes. In these banknotes some are genuine and some are forged. We randomly choose few genuine notes and few forged note for testing. Fig. 4 shows the technique for detecting Indian currency. This technique uses four characteristics of currency including watermark, note size, serial number, and identification mark of the note. One's the note is detected as genuine note, as per further requirement of the user, process can be stop or it can be continued for dispensing of coins.

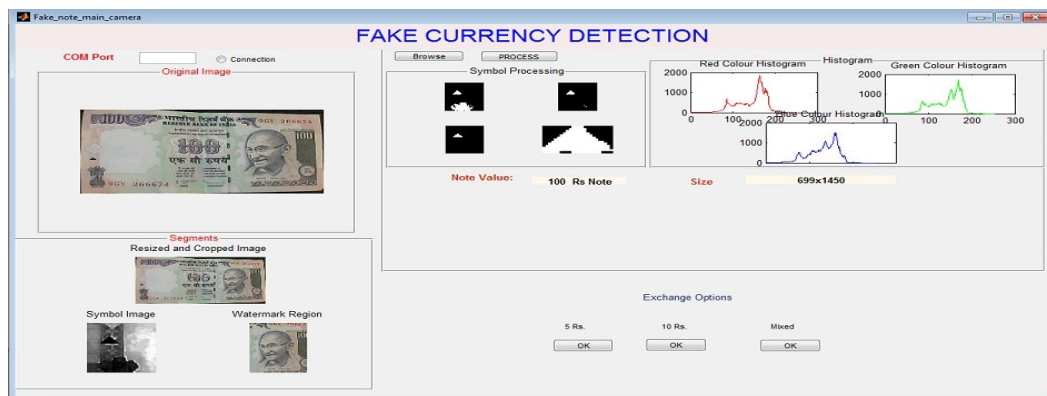


Figure 4. Simulation result

V. CONCLUSION

The main motive behind this is to present the system based on recognition of counterfeit currency banknotes to avoid frauds. The note value is identified by using database. After that watermarked region is extracted by using segmentation method and RGB, histogram is plotted for the watermarked region. The proposed system will be helpful in day to day life of every common man where people have to suffer for change at many public places.

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