

Design of Counterfeit: Currency Detector

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Abstract-

Money is an integral part of our needs so its genuinity is important. Circulation of fake money can disturb the economic growth process of our country. Circulation of fake money causes much inconvenience to people. Many people are still not aware of how to detect fake notes and the measures which are to be taken into consideration. In this paper we are focusing on an advanced mobile based application that is used to identify fake money. Application of Counterfeit is to empower the common man with an easily available device to help him detect fake notes. This application can be used on day-to-day basis by us for identifying fraudulent currency notes then and there. Unlike existing money detectors in banks, Counterfeit: Currency Detector will provide user friendly and portable application to find forged banknotes.

Keywords: Counterfeit, currency detector, mobile application.

I. Introduction

Modern economy is a money economy where all exchanges take place through money. Satisfaction of human wants is possible with a help of money. The intensity of want and the attainment of utility can be measured easily with the help of money. 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. Hence if any citizen is getting fooled with a fake bank note by a vegetable vendor in the middle of the market then it is not so feasible for the citizen to take that note to the bank, check the note and come back to the vendor.

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.

Our mobile application exactly targets these needs. As our application will be available on mobile phones it would be easier for human being to test the forged bank notes. It allows us to comfortably check the currency notes then and there itself. This application uses techniques for detection of watermark, security thread, currency number series, see through register and identification mark.

The user of our application does not require knowing any of the internal working of this application. The user will get a straight forward result for the required note by following few simple steps.

The aim of our project is to create a user-friendly and easily available application for testing counterfeit currencies. This application will be easily available on internet for users to download it and then install it. Then user just needs to take an image of the note and the rest of the work will be done by the currency detector software. Thus, result will be provided to the user.

II. Existing System:

A. FakeNoteDetectorMachine:

Fake Note Detector machine is used mainly in banks, self-checkout machines, retail stores. It examines the currency that has been inserted and by using various tests, it determines whether currency is counterfeit or not. Common people have facility to find the fake currency using machines available only in banks.

When you place a banknote in this machine, it will scan the ultraviolet properties of the banknote and the magnetic

ink present on the banknote. Machine will stop and alert the user when a counterfeit banknote is detected.

Features:

- 3-point counterfeit detection: magnetic ink, metal thread and ultraviolet.
- Automatic banknote verification.
- Easy to use.

Limitations:

- Not portable everywhere.
- Detection can be done at certain places like bank and some retail stores.

B. Counterfeit Detector Pen:^[1]

A counterfeit banknote detection pen is a device used to apply an iodine-based ink to banknotes in an attempt to determine their authenticity. Typically, genuine banknotes are printed on paper based on cotton fibers, and do not contain the starches that react with iodine. While detecting a note, pen contains an **iodine solution** that reacts with the starch in wood-based paper to create a black stain. When the solution is applied to the fiber-based paper used in real notes, no discoloration occurs.

Features:

- Detect notes printed on normal copier paper instead of the fine papers used by genuine authority.
- Effective against notes printed on standard printer or photocopier paper.
- If the note is real, the ink turns yellow.
- If the note is counterfeit, it will turn a dark blue or black.

Limitations:

- Not applicable for starch free papers.
- Effectiveness is much lower.

C. Counterfeit Money Detector:^[2]

Counterfeit Money Detector is a mobile based application which allows user to see little marks and other security measures to probe a banknote's authenticity under an Ultraviolet light.

Features:

- Provides Watermark detection.
- Provides UV lamp on mobile screen to detect security measures

Limitations:

- User himself has to see marks on banknotes and identify whether it is genuine.
- Knowledge about counterfeit notes is required.

III. Proposed System:

The application is an online application. Thus, it requires continuous Internet connection for its execution. User can install this application on his mobile before using it. Also this application will be available on the Internet for free. This will make this application easily available for human usage.

This application is user-friendly and can be used on day-to-day basis. For using this application, user need to take a photograph of the required note holding it against sufficient light. This light could be any light like sunrays, tube light or bulb which helps the camera of mobile phone to detect the different features of the note. Then the software examines the note and gives the appropriate result to the user about the authenticity of the note.

Below is the basic working of the application:



Figure 1: Block Diagram

This application has mainly Watermark Detection, Security Thread Detection, checking currency series number, identification mark and sees through register mechanism which actually detects the trueness of the currency. The GUI of this application is user-friendly to check the currency. User is completely unaware of the complexity of counterfeit currency. Finally the currency detector software provides the result to the user of the required currency based on the comparison done between the details of genuine note stored in the database and the tested note.

So basically, the application eases the process of testing the trueness of the currency. It reduces time to check counterfeit note and also money which would have been lost if the note is fake.

IV. System Analysis:

A. Image Sending Module:

In this system we propose to use cloud service to send the images from android mobile to the remote server. Cloud storage is a service model in which data is maintained, managed and backed up remotely. The cloud data is made available to users over a network, typically the Internet.

Following are the advantages of using cloud services:

- It provides a secure passageway to send images to the server without suffering any distortion.
- For streaming media from the cloud to the mobile phone, there is no need to save the files on the mobile phone. Media takes up huge amount of

memory. Streaming the media instead of storing it on the user's mobile phone saves space in the phone's memory. This reduces load on the mobile phone memory.

Once the image of the currency note is received by the remote server, it has to be processed using watermark, security thread detection checking currency number series, identification mark and see through register mechanisms.

B. Different Techniques.^{[3][4]}

The different types of techniques that are used to detect forged notes are:

(a) Watermark Detection:

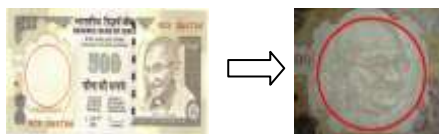


Figure 2: Watermark Detection

- The Mahatma Gandhi Series of banknotes contain the Mahatma Gandhi watermark with a light and shade effect and multi-directional lines in the watermark window.
- This Watermark image will be compared with the image stored in the database of server and then result of comparison will be send to the client.

(b) Security Thread Detection:



Figure 3: Security Thread Detection

- Rs.500 notes contain a readable, windowed security thread alternately visible on the obverse with the inscriptions 'Bharat' (in Hindi) and 'RBI', but totally embedded on the reverse.
- The Rs.1000 and Rs.100 notes have a security thread with similar visible features and inscription 'Bharat' (in Hindi), and 'RBI'. When held against the light, the security thread on Rs.1000, Rs.500 and Rs.100 can be seen as one continuous line.

- According to these properties the security thread of a note will be checked and result will send to the client.

(c) Checking Currency Number Series:



Figure 4: Checking Currency Number Series

- '500' note has 9 digits as currency number out of which first 3 characters are the prefix and the next 6 are the serial numbers.
- The first character of the prefix is a numeral and next two are alphabets. The next six characters are the serial numbers which begin from '000001' to '1 million'.
- Currency number will be fetched from the image and Server will identify the number is real or not.

(d) Identification Mark Detection:



Figure 5: Identification mark Detection

- A special feature has been introduced on the left of the watermark window on all notes except Rs.10/- note. This feature is in different shapes for various notes (Rs.20-Vertical Rectangle, Rs.50-Square, Rs.100-Triangle, Rs.500-Circle, and Rs.1000-Diamond) and helps the visually impaired to identify the note.
- Server will identify the mark and compare it with original image present in database.

(e) See through register:



Figure 6: See through register

- The floral design printed on both the front and reverse in the middle of the vertical band next to the watermark window.
- It has the numeral "500". Half of the numeral is printed on the front and half on the reverse. Both the printed portions have an accurate back to back registration so that the numeral appears as one when viewed against light.

V. System Design:

The system has following modules:

A.

Android Mobile Phone

- (a) Image Capture Module
- (b) Image Sending Module

B.

Remote Server

- (a) Image Processing Module
- (b) Image Comparison Module
- (c) Result Generation Module

A.

Android Mobile Phone:

(a) Image Capture Module:

- The camera integrated inside the mobile phone takes an image of the currency note. The camera used for image capture is of high megapixel resolution. User has to capture 3 photos of banknote in appropriate presence of light as specified by the mobile application.
- First picture containing clear presence of

watermark, identification mark and see through register image is taken. Then security thread and currency number containing pictures are taken.

(b) Image Sending Module:

- This sends the currency note image taken by the camera to the remote server through the cloud service. Image is sent to the server in jpg format and further processed in the remote server.

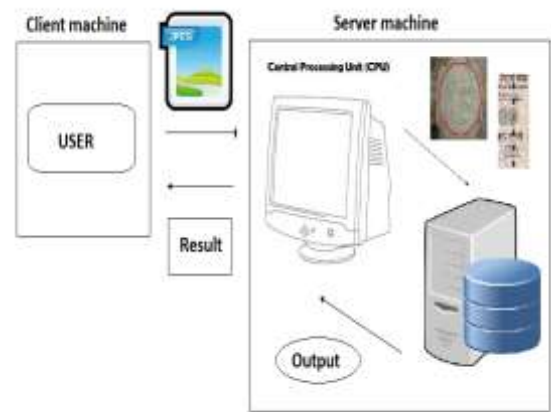


Figure 7: Counterfeit: Currency Detector Architecture

B.

Remote Server:

R

(a)

Image Processing Module:

- Given the input image I (768x432 pixels , 24bit color depth) , we first convert it to grayscale and convolve R with 3x3 Gaussian low-pass filter to eliminate high frequency noise.
- Then we apply canny edge detector to detect all the regions in the image.
- The resulting binary image now consists of closed contours. Within the selected region we detect points of interest.

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(b) Image Comparison Module:

- Find matching interest points from reference images of banknotes. For a given point from reference image we calculate the distance from it to the closest point from test image and the second closest (all distances are in

descriptor space), which we call d_1 and d_2 , respectively.

- On basis of the values of d_1 and d_2 we compare the banknote watermark with reference banknote image.
- If the value matches, the watermark detection is successful then security thread detection is done.

(e) Result Generation Module:

- Server machine generates the result and send it to user.
- User will get direct result that the banknote is genuine or counterfeit.

VI. Features:

- This application provides direct result about trueness of the bank note.
- User need not to have any knowledge about security features of currency
- Provides detection techniques like watermark detection, security thread detection, checking currency number series, identification mark detection and see through mechanism.
- This application is user friendly and can be used on day-to-day basis.
- Easily understandable.

VII. Goals:

- To find solution for common people to judge a forged bank note and to refrain our currency from losing its value.
- To automate the process of detecting the counterfeit bank note.
- To provide easily available and free of cost application for common man to detect genuinity of bank note.

VIII. Benefits:

- **User friendly:** it provides simple and interactive interface. It is easily understandable by common people.
- **Time saving:** people don't have to waste time for detecting bank notes using Fake Money Detector available commonly in banks. Using this mobile application, this work will be done in less time.
- **Available on internet:** user can easily find this application; download it and use it for free.

IX. Limitations:

- For proper functioning of the application mobile should have good picture resolution capability.

- Pictures clicked by user must be as much as clear as possible. And it may not be possible for the user to click perfect pictures.
- Internet facility should be available on mobile.

X. Conclusion

Detecting the fraud notes is need of common man today. Counterfeit: Currency Detector is convenient, time-saving, user-friendly and portable and will soon be seen on all the mobile platforms for users. It will be advancement in the currency detecting technology. Henceforth, common people would not require running to banks for checking a note. Also this is a step towards reducing issues like inflation which occurs due to Counterfeit currencies.

XI. References

- [1]<http://money.howstuffworks.com/question212.htm>
 [2]<https://play.google.com/store/apps/details?id=com.appsimple.DetectorBilleteFalso2>
 [3]http://rbi.org.in/SCRIPTS/ic_banknotessecurity.aspx#mark
 [4]<http://currencyguide.eu/inr-en/500inr-en.html>