

Detection of Fake Currency using Image Processing

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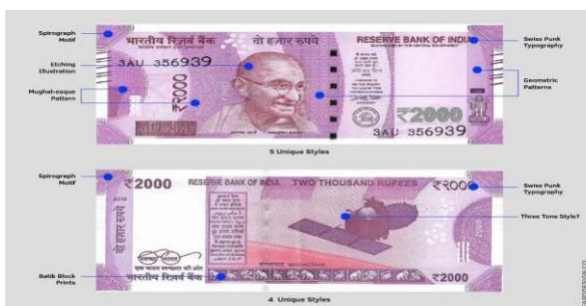
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Abstract— In recent years a lot of fake currency note is being printed which have caused great loss and damage towards society. So, it has become a necessity to develop a tool to detect fake currency. This project proposes an approach that will detect fake currency note being circulated in our country by using their image. Our project will provide required mobility and compatibility to most peoples as well as credible accuracy for the fake currency detection. We are using image processing and cloud storage to make this app portable and efficient.

Keywords — Machine Learning, Image Processing, SVM algorithm, Cloud Storage.

I. INTRODUCTION

Fake currency detection is a serious issue worldwide, affecting the economy of almost every country including India. Currency duplication also known as counterfeit currency is a vulnerable threat on economy. It is now a common phenomenon due to advanced printing and scanning technology. The possible solutions are to use either chemical properties of the currency or to use its physical appearance. The approach presented in this paper is based upon physical appearance of the Indian currency. Image processing algorithms have been adopted to extract the features such as security thread, intaglio printing (RBI logo) and identification mark, which have been adopted as security features of Indian currency. Hence, we propose a more user friendly and portable solution to this problem in form of an mobile app coupled with cloud storage.

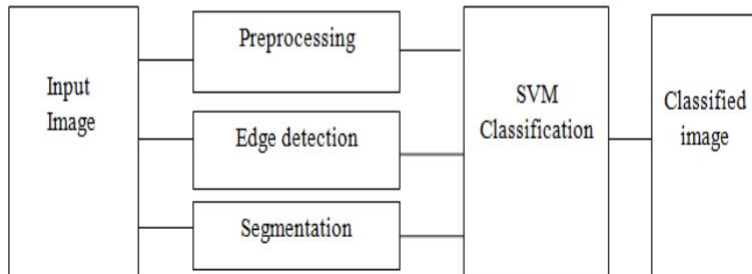


II. LITERATURE SURVEY

1. Ms. Monali Patil, Prof. Jayant Adhikari, Prof. Rajesh Babu they proposed a system which uses image processing to distinguishes between features of a real note and a fake note. They used K-means algorithm for feature clustering and SVM algorithm to train their data model.[1].
2. Mayadevi A.Gaikwad, Vaijinath V. Bhosle Vaibhav D Patil. In their research paper they have suggested a methodology of detecting fake currency from the real by comparing their visual features such as distance between Gandhiji's portrait and other notations. This methodology can be useful for a system purely based on software processing.[2]
3. Renuka Nagpure, Shreya Sheety, Trupti Ghotkar. They have proposed a system which uses the floral designs on the notes provided by RBI to distinguish between real and fake notes.[3]
4. Neeru Rathee ,Arun Kadian, Rajat Sachdeva ,Vijul Dalel, Yatin Jaie. In their paper they have suggested image processing along with supervised machine learning to learn the distinguishing feature of a real note from fake one which will increase the precision of this method.[4]
5. Akanksha Upadhyaya Research Scholar, Vinod Shokeen Associate Professor, Garima Srivastava. In their study they have proved that image processing along with logistic regression gives an accuracy of above 99%.[5]

III. EXISTING SYSTEM

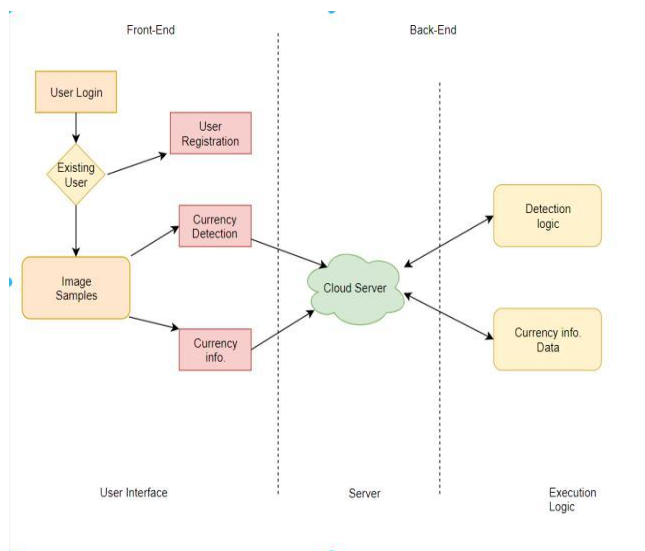
In existing system, Image processing Is being used with legacy version of machine learning algorithm. Also they are using local database which reduces the portability of system and because of their system is limited to PC device user friendliness is not good.



IV. PROPOSED APPROACH

In proposed work, we will develop a system that would perfectly assess the features of fake note and real notes based on the paper by “Ms. Monali Patil, Prof. Jayant Adhikari, Prof. Rajesh Babu”. Our proposed system will be capable of performing real time detection of fake currency as we are using cloud storage for execution of our image processing logic simultaneously reducing the size of the smartphone app which plays crucial role in memory management of daily users.

Also, our system will give live update of the identified currencies stock market values w.r.t other currencies around the globe.



System Architecture (3.1)

For example, we have new Rs 500. We will discuss their feature one.

First image is of Rs 500.

Front – Side features. (These are the observe features)



Rs 500 denomination bank notes are released in new series with inset letter ‘E’ in both the number panels and it also has the image of Mahatma Gandhi and signature of Governor Dr. Urjit R.Patel.

First of all, we will discuss the features of Rs 500 notes.

Color

The color of Rs 500 note is stone gray.

Size

The new Rs 500 note is smaller than previous note (size of at 63mm x 150 mm).

Bleed lines

There are seven “bleed lines” on the side of Rs.2000 notes, and five lines on Rs 500 notes.

Latent image

In Rs 500 note there is latent image of the denomination in numeral.

Denomination numeral in Devanagari font.

Devanagari font is also used on the currency of Rs.500.

Orientation

In previous notes of Rs 500 and current notes there are some changes in orientation and relative position of Mahatma Gandhi.

Windowed security thread

Rs.500 notes contain a readable, fully embedded windowed security thread with the inscription “Bharat” (in Hindi), and “RBI”. Which changes color from green to blue when note is tilted. Guarantee clause, Governor’s signature with promise clause and RBI emblem shifted towards right.

Portrait

The portrait has been changed in raised manner. The orientation and the portrait of Mahatma Gandhi has been changed and we can see the electrotype watermark also.

Numerals

In new currency notes numerals are mentioned in the increasing order of their size from top-left side to bottom-right side.

Ashoka pillar emblem

On the right-side Ashoka pillar emblem is present.

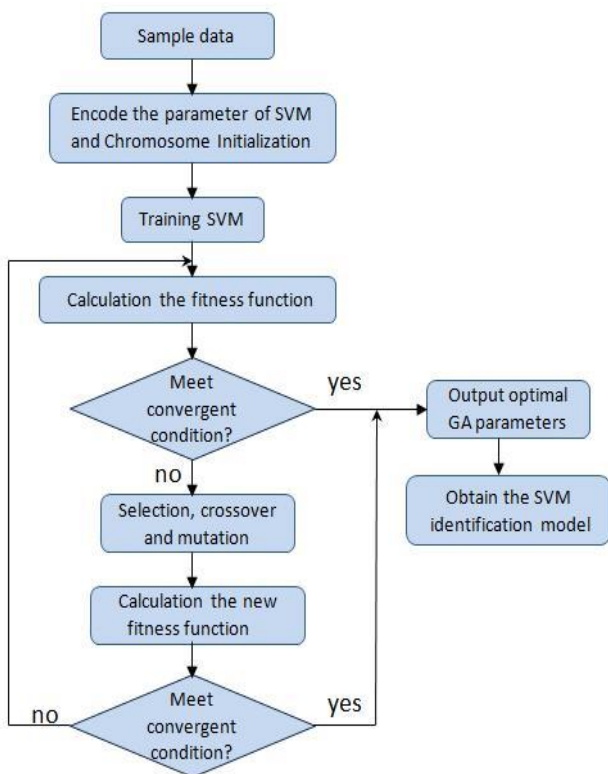
Special Features of New Currency

1. Swachh Bharat slogan with logo.

2. At the center there is a language panel.
3. Red fort with Indian tri-color (flag)
4. At the right-side denomination numeral in Devanagari

V. ALGORITHM USED

1. SVM Algorithm: In machine learning, support vector machines (SVMs, also support vector networks) are supervised learning models with associated learning algorithms that analysis data used for classification and regression analysis. Given a set of training examples, each marked as belonging to one or the other of two categories, an SVM training algorithm builds a model that assigns new examples to one category or the other, making it a non-probabilistic binary linear classifier (although methods such as Platt scaling exist to use SVM in a probabilistic classification setting).



VI. IMPLEMENTED SYSTEM

Paisa Checker is an android application developed in android studio which helps the user to capture the currency note at their convenience. The implementation is designed in such a way that a personal can check the authenticity of the note at their finger tip.

Some important modules of Paisa Checker are:

1. Welcome Screen (Splash):

The splash (fig 4.1) is the welcoming screen for the user. further user will be redirected to camera activity for capturing the picture of the currency.

2. Main Screen:

This screen (fig 4.2) is the actual activity of the app where the user will click the picture and upload it to the cloud server.

2. Backend:

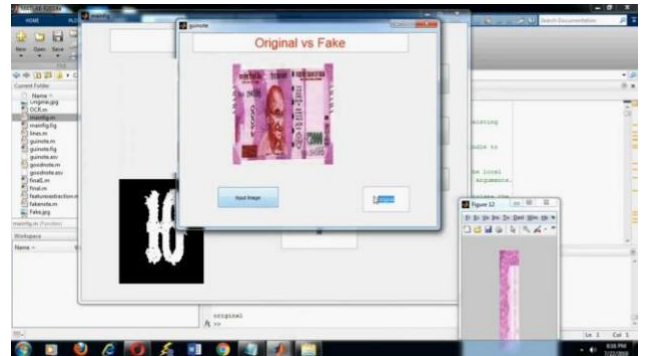


Fig. 4.1 Real note

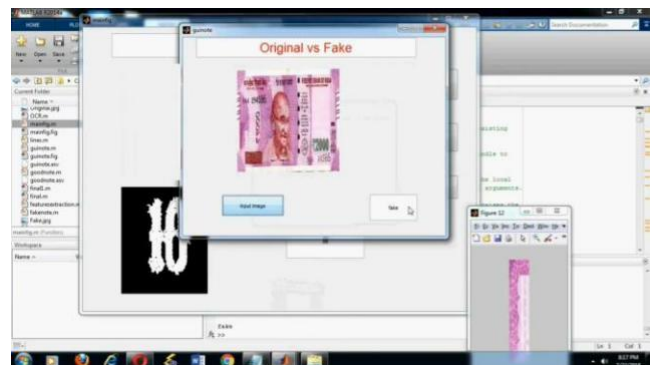


Fig. 4.2 Fake Note

VII. EXPERIMENTAL RESULTS



Fig. 5.1 Splash Screen

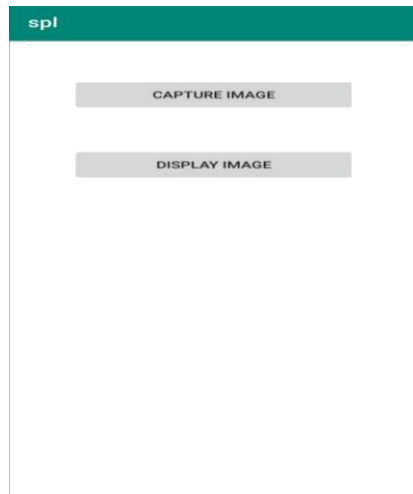


Fig. 5.2 Main Activity



Fig. 5.3 Camera activity



Fig 4.3 Image processed and converted to grayscale.

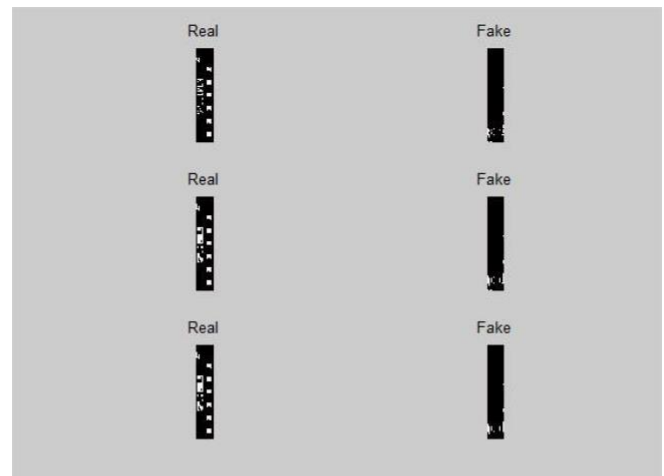


Fig 4.4 Grayscale image cropped and converted to binary

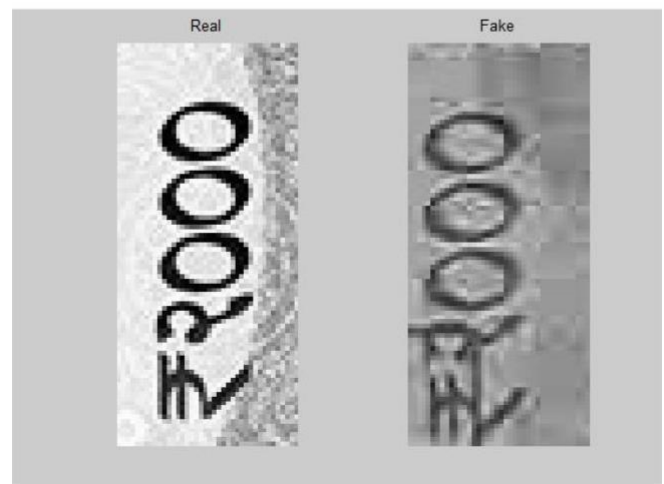


Fig 4.5 Image cropped and enlarged for comparing.

VIII. CONCLUSION AND FUTURE SCOPE

The main motive behind this project was to make a system for common man which is fast and easy to use. This is a MATLAB based system for automatic recognition for fake and genuine Indian currency. This is a low-cost system, using effective and efficient image processing techniques, provide accurate and reliable results at good throughput as shown by experimental results which are totally done at cloud server's end. The developed Matlab code works for detection of all Indian currencies and for fake detection it works with Rs 2000 and Rs 500.

In forthcoming future, as discussed by “Akanksha Upadhyaya Research Scholar, Vinod Shokeen Associate Professor, Garima Srivastava.” In their study that precision of above 99% can be achieved with image processing and supervised learning. Our proposed system could replace the hardware system in some initial stages of currency verification process.