

Counterfeit Currency Detection using Deep Learning

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Abstract: *Currency is an indispensable part of our daily life. However, how to identify true and fake currencies has become the most important issue at present. If we use a computer for currency recognition, it will greatly improve the accuracy of recognition and reduce people's workload effectively. In recent years, deep learning has become the most popular research direction. It mainly trains a dataset through deep neural networks. There are many different models that can be used in this project. It is going to utilize pattern recognition and image processing learning and analyzing methods for distinguishing features. This project will be performed on an integrated development environment of python like Jupyter Notebook, spyder, etc. and then training is done on the datasets to identify the currency, it provides an advanced features of data analysis as well as an excellent visualization.*

Keywords: Currency Recognition, Currency Classification, Deep Learning, Convolution Neural Network (CNN), Feature extraction, Image processing

I. INTRODUCTION

Fake Indian currency note is important in many applications such as automated goods seller machine and automated goods tellers machine. This system is used to detect the valid Indian currency note. The system consists of eight steps including image acquisition, grey scale conversion, edge detection, feature extraction, image segmentation, comparisons of images and output. Automatic machine more helpful in banks because banks faces the problem of counterfeit currency notes or destroyed notes. Therefore involving machine makes note recognition process simpler and systematic. Automatic machine is more important to detect fake currency note in every country. The system designed to check the Indian currency note 100, 500 and 2000 rupees. The system will display currency is genuine or fake and currency denomination. It is very important to grow automated system to get feature and recognize Indian currency note in various area such as banking, ATM machine, shopping mall, Bus station and railway station.

Counterfeit notes are a problem of almost every country but India has been hit really hard and has become a very acute problem. There is a need to design a system that is helpful in recognition of paper currency notes with fast speed and in less time.

Fake Indian currency of 100 and 500 rupees seems to have flooded the whole system and there is no proper way to deal with them for a common person. Our system describes an approach for verification of Indian currency banknotes. The currency will be verified by using image processing techniques and CNN algorithm [2].

II. METHODOLOGY

The system proposed here work here on the image of currency note under ultraviolet light acquired by a digital camera. The algorithm which is applied here is as follows

1. Acquisition of image of currency note under ultraviolet light by simple digital camera or scanner.
2. Image acquired is RGB image and now is converted to grayscale image.
3. Edge detection of whole gray scale image.
4. Now characteristics features of the paper currency will be cropped and segmented.
5. After segmentation, characteristics of currency note are extracted.
6. Intensity of each feature is calculated.
7. If the condition is satisfied, then the currency note is said as original otherwise fake.

In this method, characteristics of currencies are employed which are used by common people for differentiating for different banknote denomination. The characteristics that can be used to check the authentication of currency note are:

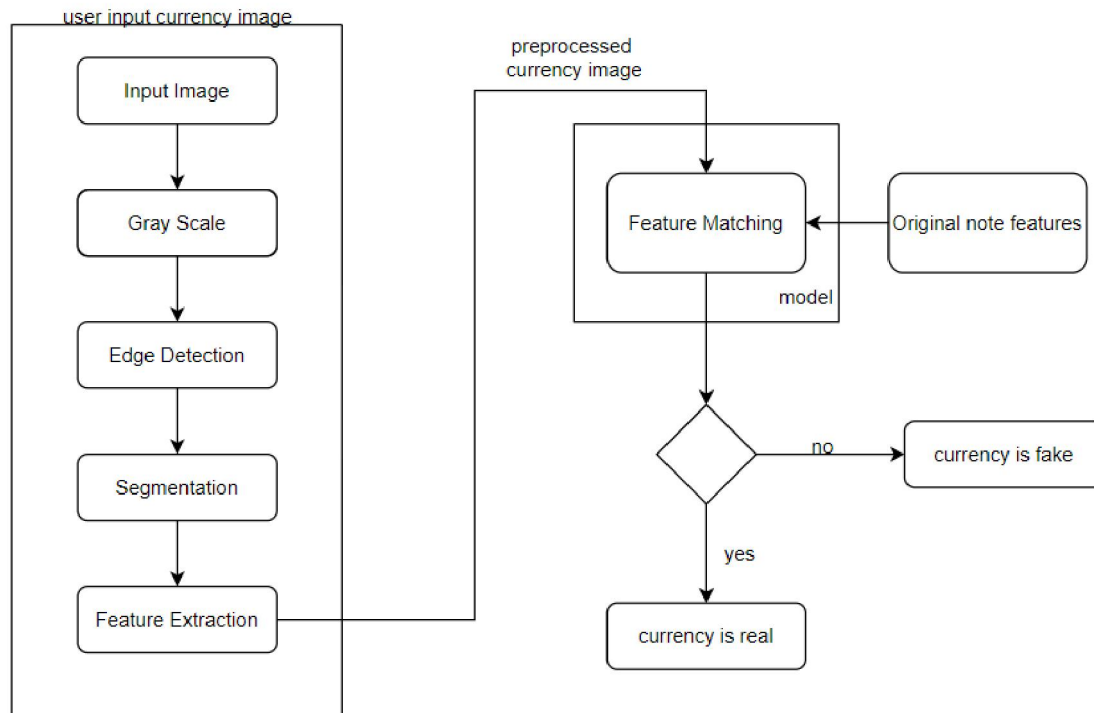


Fig. 1. Block diagram showing the working principle of a Counterfeit Currency Detection.

2.1 Security Thread

It is a 3mm windowed security thread with inscriptions of India in Hindi, RBI and 2000/500 on banknotes with color shift. Color of the thread changes from green to blue when the note is tilted.

2.2 Serial Number

Serial number panel with banknote number growing from small to big on the top left side and bottom right side.

2.3 Latent image

A vertical band on front side of denomination at right hand size. It contains latent image showing numeral of denomination when banknote is held horizontally at eye level.

2.4 Watermark

The portrait of Mahatma Gandhi, and multidirectional lines and a mark showing the denominational numeral appear which can be viewed when held against light.

2.5 Identification Mark

A mark with intaglio print which can be felt by touch, helps blind person to identify the denomination. In 500 denomination the mark is of five lines while in 2000 line the mark is of seven lines[2].

III. LITERATURE SURVEY

The discovery of counterfeit currency or fake currency maybe done in miscellaneous ways. One way to do it is by detecting the security thread feature in cash note. For detecting that feature, the most well-known method in deep neural network named transfer learning using Alex net is selected. Alex net has differing layers like convolution, max pooling, dropout, ReLU activation and Fully-connected layer. The accuracy concerning this model is very extreme as the model learns the features of the notes layer-by-layer [1].

We have also studied another manner of detecting counterfeit currency by utilizing MATLAB. MATLAB operating system is used to extract the features of the notes. The image of the note is caught through the digital camcorder and then the features of cash note are highlighted in ultraviolet light. Differing features like security thread, serial number, latent image and watermark are elicited through MATLAB. This scheme works well on new notes of Rs.500 and Rs.2000 [2]. But above procedure demands a lot of features to discover if the currency is fake or not. We can gain comparable results even while utilizing less features of the currency. The Latent Image and Identity Marks are main features of the note and we can use them to differentiate fake and authentic currency. The images of currency notes are first converted into gray scale image before the features of Latent Image and Identity Marks are derived from the image [3].

IV. CONCLUSION

In this project, detection of fake Indian currency note is done by using image processing principle. This is the low cost system. The system works for denomination of 100, 500 and 2000 for Indian currency. The system also provides accurate and valid results. The process of detection of fake note is quick and easy. In this system input is taken by CCD camera and output is displayed on PC.

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