

# Fake Currency Detection App

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**Abstract-** The main objective of this project is fake currency detection using Machine Learning. This process can be automated in a Mobile using the application software. The basic logic is developed using Image acquisition, image segmentation, feature extraction and comparison. The magnified image of the original currency is fed to the Machine learning database. The features of the note to be tested are compared with the dataset formed from the genuine magnified image and finds out whether it is genuine currency or fake. The most important challenge is systematically and methodologically repeating the analysis process to reduce the error and time.

In recent years, a lot of fake note currency is printed & at the same time some illegal counterfeiting rings manufacture and sell fake coins as well, which have caused great loss and damage to the society. Thus, it is peremptory to be able to detect fake currency. We propose a new proposal to detect fake Indian notes using their images. A currency image is represented in the dissimilarity space, which is a vector space constructed by comparing the image with a set of prototypes of genuine currency. Each dimension measures the dissimilarity between the image under consideration and a given prototype. In order to get the dissimilarity between two images, the local key points on each image are detected and described. Based on the characteristics of the currency, the matched key points between the two images can be identified in an efficient way. A post processing procedure is further proposed to remove mismatched key points. Due to the limited number of fake currencies in real life, SVM is conducted for fake currency detection, so only genuine currency is needed to train the classifier.

## I. INTRODUCTION

Currency duplication (counterfeit currency) is a vulnerable threat on economy. It is now a common phenomenon due to advanced technology of printing and scanning. Country has been facing serious problem by the increasing rate of fake notes in the market. The Reserve bank of India estimates that there is at least Rs.2 trillion of fake rupees note in circulation throughout India. To get rid of this problem various fake note detection methods are available around the world and most of these are hardware based and

costly. This machine is mostly available only in banks which is not reachable every time by average citizen. the problem is in acute situation and people want easier way to deal with it.

Fake Currency Detection App is developed for recognizing fake currency from the App. As, there are number of android mobile phone users in the country and increases per day; to provide an android application regarding fake currency detection is a good idea. The App designed to check the Indian currency note & coins. The system will display currency is genuine or fake.

### 1.1 Commonly Used Methods to Detect Fake Notes

- i. See Through Register: The small floral design is printed in the middle of the vertical band and next to watermark. The floral designed on the front is hollow and in back is filled up. The floral design has back to back registration. The design will see as one floral design when seen against the light.
- ii. Water marking: The mahatma Gandhi watermark is present on the bank notes. The mahatma Gandhi watermark is with a shade effect and multidirectional lines in watermark.
- iii. Optically Variable Ink: Optically variable ink is used for security feature; this type of feature is in the Rs.200, 500, and Rs. 2000 bank note. Optically variable ink as security feature for bank note is introduced in Nov.2000. The denomination value is printed with the help of optical variable ink. The colour of numerical 2000 or 500 appear green, when note is flat but change the color to blue when is held in an angle.
- iv. Fluorescence: Fluorescent ink is used to print number panels of the notes. The note also contains optical fiber. The number panel in fluorescent ink and optical fiber can be seen when exposed to UV light.
- v. Security Thread: The security thread is in 2000 and 500 notes, which appears on the left of the Mahatma Gandhi's portrait. In security thread the visible feature of RBI and BHARAT. When note is held

against the light, the security thread can be seen as one continuous line.

- vi. Latent Image: The latent image shows the respective denomination value in numerical. On the observe side of notes, the latent image is present on the right side of Mahatma Gandhi portrait on vertical band. When the note is held horizontally at eye level then the latent image is visible.
- vii. Micro Lettering: The micro letter's appears in between the portrait of Mahatma Gandhi and vertical band. Micro letter's contains the denomination value of bank note in micro letters. The denomination value can be seen well under magnifying glass.
- viii. Identification Mark: Each note has its special identification mark. There are different shapes of identification mark for different denomination (Rs.200-H, Rs.500-circle and Rs.2000- Square). The identification mark is present on the left of water mark.



Figure.1. Security Features of Indian Currency

## II. METHODOLOGY

### 2.1 Image Acquisition

Image can be acquired with the help of camera or scanner (as android mobile phone can have scanning application). Image should be acquired in a way that it should retain all the features.

### 2.2 Image Pre-Processing

These operations are required prior to the main data analysis and information extraction. Phase include the suppression of undesired distortions or enhance some image features.

### 2.3 Gray Scale Conversion/ Binarization

Acquired image is in RGB (Red, Green and Blue) color. Application converts it into gray scale because it carries only the intensity information which is easy to process instead of processing RGB components.[3] Application uses advanced bitmap image processing technique for this so called binarization.

### 2.4 Edge Detection

In the case of bank note detection, edge detection is very important. Various sections of a note are used to match with respective sections of an ideal currency to detect suspicious fact. An average detection is carried out by application which aim at identifying points in a digital image at which the image brightness changes sharply or, more formally, has discontinuities.

### 2.5 Image Segmentation

At this phase, image is segmented into its constituent regions or objects. Application contains predefined code to perform the action. Segmentation algorithm for monochrome images is generally based on one of the two basic properties of image intensity values-

1. Discontinuity.
2. Similarity.

Application uses very high-level programming that determines edges in the gray scale scanned bank note and finalizes sections in the image.

### 2.6 Feature Extraction

Feature extraction is the special form of dimensionality reduction Application observes the visual content of images for indexing and retrieval. When the input data to an algorithm is too large to be processed then to detect fraud, it is to be observed in sections to get better result. For this phase, application uses all the data from gray-scale conversion, edge detection, segmentation. Feature extraction involves simplifying the amount of resources required to describe the large set of data. It resolves domain specific attributes that includes features given in First Line Inspection Method

#### Attributes are categorized into:

1. General attributes includes color, texture, and shape.
2. Global attributes include moment invariant, aspect ratio and circularity.
3. Local attributes include boundary segments.

## 2.7 Comparison

Finally, application gives the result where all the extracted features are used to match with original currency note. If it matches, application gives result as original otherwise gives result as fake.

## III. EXPERIMENTAL RESULT

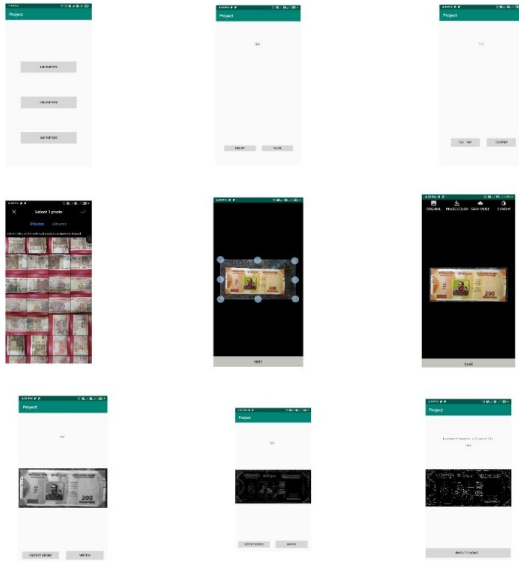


Figure shows a case observed for a banknote, windows appearing one by one on mobile as we go for various phases.

## IV. SYSTEM REQUIREMENT

### 4.1 App Development Requirement

- Processor - Intel (R) Core (TM) i3
- Installed RAM - 4 GB or More
- HDD – 80GB
- I/O – Desktop, Keyboard & Mouse
- Operating System - Windows 7/8/10
- Programming Lang. and tools –Android Studio, OpenCV,Java

### 4.2 App Running Requirement

- Latest Android App running device or mobile (basic version 4.2.2 or afterwards)
- Camera & Storage Permissions

## V. RELATED WORK

Known previous work on Fake Currency Detection App involved the use of different method to find fake currency. Some of these works are discussed below.

### 5.1 A Phone App to detect fake notes by NehaN.

A 21-year-old Mysore based engineering student Neha N.developed a cellphone application that can tell real currency notes apart from their counterparts. According to Neha's research, a fake note when held against light, shows you a portrait of Mahatma Gandhi that is also seen on fakes but not as prominent as in a genuine note. In addition, all real notes have water marking made of magnetic ink and will glow in ultraviolet light, Neha developed an application to detect such watermarking.

### 5.2 Phone App to detect fake notes by SJEC's students

Students of Electronics and Communication Department from St. Joseph Engineering College (SJEC) have designed a counterfeit note detector that can test the authenticity of Indian currency notes. The device can test the notes with the help of security features available on the note. It's capable of ascertaining the denomination of the currency and tracking the serial number.

### 5.3 A Phone App to detect fake notes by NinaadPai

As a Project intern, worked on previously existing optical character recognition techniques. Design and development of character recognition operation for image to text conversion of serial numbers on Indian federal banknotes for counterfeit detection.

## VI. CONCLUSION

The main motive behind the development of this application is to provide a better way for people to find out about money using an easily accessible device.

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