

## Android Application on Fake Indian Currency Recognition

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### Abstract

*The paper proposes development and use of an android application on Fake Indian Currency Recognition. By using it, anyone can easily detect fraud currency using their android mobile cell. In the country, the problem is in acute situation and people want easier way to deal with it. 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. Here, various development phases and the use of an application is described. Using Eclipse ADT (Android Development Tool) app is generated. The proposed system consists of mainly three processing steps:*

1. Image segmentation based on image intensity values (Discontinuity, Similarity).
2. Feature extraction, involving a general attributes which include color, texture and shape.
3. Extracted features investigation by using admin data for decision making about currency (either original or fake).

**General Terms-**Image Acquisition, Image Pre-processing, Gray scale conversion, Image Segmentation, Feature Extraction, Bitmap Image Processing, Edge Detection etc.

**Keywords-**Bitmap, Watermark, Register, Micro Letters, Intaglio, Portrait, Dimensionality, Circularity, Distortion etc.

### 1. Introduction

The Indian Currency Recognition based on First Line Inspection method & Second Line Inspection Method (Image Processing). First Line Inspection Method

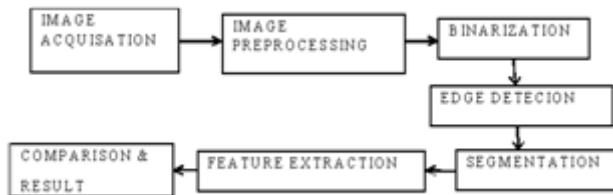
contains security features like Water mark, Latent Image, Micro Letters, Register, I. D. Mark, Security Thread, Intaglio Printing and Number Panel. Still it is difficult to detect fraud just by observing all these factors [2]. Image processing is better solution for such problem. We need a device to observe the bank note and to interact with hardware, we need an application. Application of image processing goes through various stages: Image Acquisition, Pre-processing, Gray scale conversion, Edge Detection, Image Segmentation, Feature Extraction and Result. Here, provided application relies on client – server mechanism, so that it will be updated every time (as Admin will store the samples coming from clients for the pattern detection). It will be useful in a way to solve the problem raised by higher techniques involved in fraud [1].

Following figure shows security features of Indian currency generally checked by banking people for authenticity of currency. They involves intaglio printing, watermark, Mahatma Gandhi portrait, micro letters, latent image, identification mark, security thread, register and number panel. From these features some features are extracted for digital image processing.



Figure.1. Security Features of Indian Currency

## 2. Methodology



**Figure. 2. Fake Indian Currency Recognition Methodology Algorithm**

### 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.[1]

### 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 [4].

### 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[5].

#### 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.

## 3. System Requirement

### 3.1 App Development Requirement

- Processor - Intel (R) Core (TM) i3
- Installed RAM - 1 GB
- HDD – 80GB
- I/O – Desktop, Keyboard & Mouse
- Operating System - Windows 2000/XP/7/8
- Programming Lang. and tools – java, eclipse

### 3.2 App Running Requirement

- Latest Android App running device or mobile (basic version 4.2.2 or afterwards)
- Uninterrupted Internet Access

#### 4. Experimental Result

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

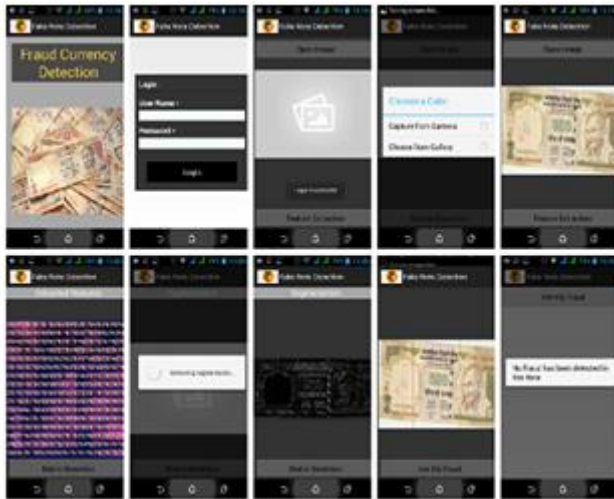


Figure. 3. Android Application on Fake Indian Currency Recognition

#### 4. Related Work

A lot of work is done and on-going regarding the problem. There are various applications developed by number of I.T. professionals and students. Some of them are mentioned here

##### 4.1 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.

##### 4.2A 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.

##### 4.3A Phone App to detect fake notes by NinaadPai

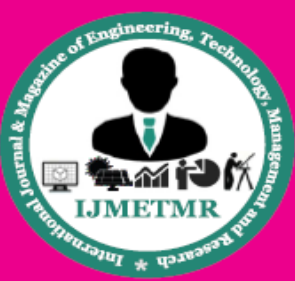
As a Project intern, worked on previously existing optical character recognition techniques. Design and development of character recognition operation for image to text conversion of serial numbers on Indian federal banknotes for counterfeit detection.

#### 5. Conclusion

The main motivation behind the development of this application is to provide a better way for people to detect fraud in currency notes using an easily available device. When we used application, it is possible to detect such fraud and the procedure to use application is simpler than any other technique. We used client – server application technique, the problem arises due to the enhancement in the printing of fake note is not a big issue, as everyday more sampling results are conducted on server and those are stored for the further comparison with next arriving samples from clients.

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