



## **A Review on Fake Currency Detection Techniques**

Name : Monali Patil

Project Guide: Jayant Adhikari

Co-Guide: Rajesh Babu

CSE Department

TGPCET, NAGPUR

### **Abstract**

Coins and note currency are widely used in our daily life such as vending machines, parking meters, telephone booths and so on. In addition to being used as currency, people enjoy collecting coins and notes as they usually have artistic value and can give a vivid insight to the social life in history. However, in recent years, a lot of illegal counterfeiting rings manufacture and sell fake coins and at the same time fake note currency is printed as well, which have caused great loss and damage to the society. Thus it is imperative to be able to detect fake currency. In this paper we have reviewed different techniques and work done by authors in this domain of fake currency detection.

Keywords—Fake currency, fake currency detection, currency image representation, dissimilarity space, class learning.

### **Introduction**

Human rapid approach is towards mechanization and manpower removal of the service work as much as possible and using this force in the development of scientific and research issues. This approach

will lead to advances in science and technology. Automated payment systems, including mechanized systems are considered more in recent years over the past and many activities in this regard is yielded. One of the main parts in most

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automated payment systems is vision systems. One of the important science that is used in vision systems is science image processing. Image processing has flexibility and as a result it provides stronger algorithms in the field of creativity. Efficient algorithms (in automatic payment systems) have two factors of speed and the ability to tolerate noise. Banknote recognition system is a device that is able to recognize the value of banknotes intelligently and approve their forgery.

Automatic recognition of 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 [1]. 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.

### A. Commonly Used Methods to Detect Fake Notes

1) 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 seen as one floral design when seen against the light [1].

2) 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 [5].

3) Optically Variable Ink Optically variable ink is used for security feature; this type of feature is in the Rs.1000 and Rs.500 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 1000 or 500 appear green, when note is flat but change the colour to blue when is held in an angle [4].

4) Fluorescence Fluorescent ink is used to print number panels of the notes. The note also contains optical fibre. The number pannel in fluorescent ink and optical fibre can be seen when exposed to UV light.

5) Security Thread The security thread is in 1000 and 500 note, 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 [4].

6) 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.

7) 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.

8) Identification Mark Each note has its special identification mark. There are different shapes of identification mark for different denomination (Rs.100-Triangle, Rs.500-circle and Rs.1000- Diamond). The identification mark is present on the left of water mark [1].

### Literature Survey

**1. Li Liu, Yue Lu "An Image-Based Approach to Detection of Fake Coins" in IEEE TRANSACTIONS ON INFORMATION FORENSICS AND SECURITY June 2017.. [1]**

Authors propose a new approach to detect fake coins using their images in this paper. A coin image is represented in the dissimilarity space, which is a vector space



constructed by comparing the image with a set of prototypes. Each dimension measures the dissimilarity between the image under consideration and a prototype.

Disadvantages:

Detect only coins while much of trade is done in terms of notes not coins.

**2. Jianxiao Liu, Zonglin Tian, Panbiao Liu, Jiawei Jiang, “An Approach of Semantic Web Service Classification Based on Naive Bayes” in 2016 IEEE International Conference On Services Computing, September 2016 [2]**

Author describe a system developed for discriminating fake notes from genuine ones and apply it to Indian banknotes. Image processing and pattern recognition techniques are used to design the overall approach. The ability of the embedded security aspects is thoroughly analyzed for detecting fake currencies.

Disadvantages:

Accuracy is less than 50% and work on very limited sets.

**3. Bo Tang, Student Member, IEEE, Steven Kay, Fellow, IEEE, And Haibo He, Senior Member, IEEE “Toward Optimal Feature Selection In Naive Bayes For Text Categorization” In IEEE Transactions On Knowledge And Data Engineering, 9 Feb 2016.[3]**

Author propose a novel shape feature—angle-distance. After images are segmented, a vector of size  $360 \times 1$  is deployed to represent each shape. For classification, a dissimilarity measurement is used to quantize the difference between two shapes. The results show it can recognize the fake coins successfully.

Disadvantages:

System is very complex and works on US coins only. None of research is conducted for Indian coins.

**4. Amruta Pandit , Prof. Manisha Naoghare, “Efficiently Harvesting Deep Web Interface with Reranking and Clustering”, in International Journal of Advanced Research in Computer and**



**Communication Engineering Vol. 5, Issue  
1, January 2016.[4]**

Author propose a variable-length signature for near-duplicate image matching in this paper. An image is represented by a signature, the length of which varies with respect to the number of patches in the image. A new visual descriptor, viz., probabilistic center-symmetric local binary pattern, is proposed to characterize the appearance of each image patch. Beyond each individual patch, the spatial relationships among the patches are captured.

Disadvantages:

System won't work for Indian coins.

**5. Anand Kumar , Rahul Kumar, Sachin Nigle, Minal Shahakar, "Review on Extracting the Web Data through Deep Web Interfaces, Mechanism", in International Journal of Innovative Research in Computer and Communication Engineering, Vol. 4, Issue 1, January 2016. [5]**

Author propose an automatic recognition method for ancient Roman coins. The proposed method exploits the structure of the coin by using a spatially local coding method. Results show that the proposed method outperforms traditional rigid spatial structure models such as the spatial pyramid.

Disadvantages:

Works on ancient Roman coins. Indian coins shapes and sizes are very different and thus won't work with this system.

**Conclusion**

The authentication of Indian paper currency is described by applying image processing. Fake note or Counterfeiting of bank notes affects the survival of the financial symmetry as its value, rapidity, output and wellbeing may be affected. Majority of countries uses paper money for transactions, overwhelmed by this difficulty. In this paper, we have conducted a survey by going through different literature, which describes different techniques of fake note identification. We have concluded that if we apply some efficient pre-processing and



feature extraction technique we can still improve the accuracy of identification system.

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