

# A Survey On Techniques Used To Detect The Counterfeit

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**Abstract:** Counterfeit notes are the major issue which dwindles the economy of various countries including India. Due to circulation of the fake notes ,the life style of the people has been severely affected. One of the major domains that have been used in counterfeit detection is Image Processing. The image Processing uses segmentation in which the images which have been captured and partitioned into various regions from which different features of the images can be extracted. The extracted features are used to distinguish the counterfeit notes from the original one. Based on the literature survey, some of the techniques used to detect fake notes are Image processing, Machine learning, SURF, ACO (Ant Colony Optimization), Edge Detection, CNN, NFC, RFID, Template matching, deep learning, SIFT.

**Index Terms:** Image Processing, segmentation, counterfeit, SURF, ACO, CNN, NFC, RFID.

## 1. INTRODUCTION

Image processing technique in which the operations are performed in the image itself in order to get the higher performance with high quality. It is a type of signal processing with an image as input and output in the form of an image or characteristics or features associated with that image .Some of the operations involved are Image acquisition, storage, processing, communication and display. In image acquisition the images are gathered from the respective sources. The Storage in image processing deals with Maximum number of images which can be stored, Minimum time taken to response, Trust and Security. Some of the important applications of image processing includes face recognition, hand print recognition. Machine learning is a technique used in AI in order to train a system to think by itself. Machine learning is classified into Supervised learning, Unsupervised learning and Reinforcement learning. Supervised learning is the machine learning which needs to be trained with the sample dataset. Supervised learning is further classifies as two concepts namely Classification and Regression. Classification separates the data into various groups while regression fits the data into a set of given conditions.. Unsupervised learning is further divided as clustering and association .Clustering mainly deals with finding a structure or pattern in a collection of uncategorized data. Association discovers interesting relationships between variables in large databases. Reinforcement machine learning allows system to automatically determine the ideal behavior within the limited time in order to maximize the performance. and writing recognition is stated to be developing rapidly inside the current globalization. Handwriting reputation is something that is able to describe the ability of computer system to translate the human writing to text writing. However, handwritten to text on the majority smart devices is not decipherable. Most of the time there is variability in handwritten text which are initiate by characteristic such as writing speed, movement of the user, space available for writing, overlapping of character and sloppiness.

## 2 RELATED WORK

There are many techniques in which the the fake notes can be separated from the original one. [1] Machine learning is used to distinguish the fake notes from the original notes by extracting the features from the original one and compare it with the fake note which is to be checked. The project is mainly dependent on the sensors to carry out the process.[2]

By using the Edge detection ,CNN,SURF the original notes can be differentiated from the fake ones. This project cannot be used by the visually impaired person.[3] By using Image processing and SVM(Support Vector Machine) the original Ethiopian notes can be distinguished from the fake notes which is being circulated in the business arena

## 3 SURVEY

S.NO	YEAR	TITLE	AUTHOR	PROBLEM ADDRESSED	TECHNOLOGY	LIMITATIONS	CONCLUSIONS
1	2019	Morphology based banknote fitness determination	S. Lee, E. Cohol, V. Baek, C. Lee	Replacing the fake notes from the circulation and maximizing the usage of real one	Machine learning	Overly rely on image sensors.	Determines the circulation of unfit notes among the original one's
2	2018	Detection of fake Indian Currency.	GouriSanjay Tele, Sneha Mahakar, Bharat shoo.	Determine the fake notes from the real one.	Edge detection, CNN, SURF.	Cannot be used by visually impaired person.	Gives the opportunity to determine whether the currency is real (or) fake.
3	2018	Ethiopian bank note Recognition and fake currency detection using SVM	Englass Ayalew Tessfaw, Bhupendra Ramani.	To recognize Ethiopian bank notes and separate it from the unfit notes	Image Processing SVM.	The accuracy rate is low.	Provides the method to differentiate Ethiopian bank notes from other countries note.
4	2018	Effective identification of black money, fake currency using NFC, IOT and android.	J.Refonaa Ginnu, George Sebastian, Dilip Ramanan, M.Lakshmi.	To eradicate black money and fake currency from the circulation	NFC, RFID, Image Processing.	The practical implementation of the concept requires high capital. Amount and difficult to implement.	Method to detect the black and unfit currency from the white and fit currency Effectively.
5	2018	Design and implementation of fake currency detection system.	Achal Kamble, M.S.Nimbarte.	To detect the fake currency from the circulation using class learning and dissimilarity Spaces.	Class learning.	Not cost effective and time consuming	Provides the alternate method from the traditional method to check whether the currency is real (or) not
6	2018	Detection and recognition of fake currency notes.	Abhiram Kumar, Bhunaneshwari, Balachander.	Detecting fake currency notes by using RGB and HSV.	Image Processing	The accuracy of the results are low	Provides the method to detect fake notes using colors.
7	2018	Indian currency recognition and speech synthesis for visually impaired person	Venkata Sai Teja, A.Krishnamoorthy, P.Boominathan.	To formulate the system Which recognize fake Indian currency and speech synthesis for visually impaired	Edge detection, Template Matching.	Practical implementation is slightly difficult and accuracy is low.	Method to help visually impaired person to detect whether the currency is original or not.
8	2018	Counterfeit currency detection techniques.	Akansha Upadhya. Vinod Shoken. Garima Srivastava	To design a system to distinguish the fake currency from original one.	Image Processing, Machine Learning	A robust system is needed to find the fake currency with high Accuracy.	A system is designed to implement the fake currency detection techniques.
9	2018	Hybrid discriminative model for banknote recognition and anti counterfeit	Van-dung-hoang, Hoang-Thang-vo	An approach for recognition of paper currency using deep learning.	Deep learning	Less accuracy.	A system is designed to recognize paper currency using deep Learning and feature extraction.
10	2018	ACORB- An ACO and ORB based Hybrid image feature detector	Vishay Ravel, Apurva Shah.	An research for Indian currency recognition for blind people.	Image Processing, ACO.	High execution time.	The alternate to ORB feature detection has been proposed and implemented.
11	2018	Bank note		Detection of	Currency	proposed by taking	Counterfeit notes

		counterfeit detection through background texture printing analysis.	Albert Berengel, Joseph Lladós, Cristiana canero.	counter fit photocopy bank notes	forensics, SVM, SIFT.	consideration of only one of printer not for inkjet and laser printers.	can be detected through texture printing analysis
12	2016	Design and implementation of paper currency recognition with counterfeit detection	Sahana Murthy, Jayanta Kuru Mathur, Roja Reddy.	To determine the unfit notes from fit notes with high accuracy	Image Processing	Accuracy can be improved by more than 90% but this process takes time	This method provides the desired result with High accuracy.
13	2016	Feature fusion of fake Indian currency detection	Neeru Rathee, Arun Kadian, Rajat Sachedeva	Determine the counterfeit notes from fit notes by fusing important features of security thread ,indigo printing, Identification mark.	Image processing,	Only physical features are taken.	This approach Fuses important features of security thread, indigo printing, Identification mark to give best accuracy.
14	2015	Philippine currency bill counterfeit detection through image processing and canny edge technology	A.H.Ballado J.C.Delacruz N.M.Echano.	To find counterfeit notes by using image processing and canny edge technology.	Image processing, Canny edge detection	Duration of detection process is long.	Counterfeit notes can be found by image processing and canny edge technology
15	2014	Image processing based feature extraction of Bangladeshi Notes	Zahid Ahmed. Sabina Yasmin. Raihan Udin Ahmed	Provides a core software system to build automated counterfeit Detection tool.	SURF, OCR.	Limitations are relating hardware and printing standard of Bangladeshi paper currency	Provides a novel method to the original Bangladeshi notes from fake one.
16	2013	Counterfeit currency detection using image processing , Polarization principle and holographic technique	Kamesh Santhanam. Anbu Mani. Sairam Sekaran.	Finding counterfeit notes using uv detection and polarization of lights	Polarization Image processing	Practical implementation of the technique is quite difficult.	Fake notes can be found by using polarization principles.

#### 4 CONCLUSION

The different type of techniques such as Image processing ,SURF , Machine learning ,OCR, Polarization,,Canny edge Detection ,SVM ,SIFT ,NFC ,RFID are used to identify the fake notes from the original one. .But speed at which the fake notes are identified and percentage of identifications are still at more advanced level. It can be further enhanced by taking deep learning into consideration . The percentage of identification of fake notes can be increased by considering various features as input.

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