A Review on Fake Currency Detection and Image Quality Improvement

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Abstract- Counterfeit currency detection is a major issue around the world, influencing the economy of pretty much every nation including. The utilization of fake money is one of the significant issues looked all through the world now days. The forgers are getting more earnestly to find as a result of their utilization of profoundly trend setting innovation. One of the best techniques to quit forging can be the utilization of fake location programming that is effectively accessible and is proficient.

Keywords- Image Processing, Feature Extraction, K-means Algorithm, Edge Detection..

I. INTRODUCTION

Duplicating money represents the unlawful replication of unique money, henceforth fake money is a phony cash that has not been approved by the administration. RBI is the main body which has sole duty to print cash notes in India. Consistently RBI faces the issue of fake money notes, once separated and flowed in the market. Counterfeit note discovery framework is created for perceiving counterfeit note from the certifiable. The main arrangement that is by and by accessible for basic man to recognize fake cash is Fake Note Detector Machine.

This machine is for the most part accessible just in banks which aren't reachable each time by normal resident. Every one of these situations needs a sort of answer for average folks to pass judgment on a fashioned monetary certificate and to cease our money from losing its worth. The technique of picture preparing depends on the extraction of the highlights of banknotes. Pictures are handled by utilizing different procedures of picture preparing and assist different highlights are extricated from the pictures.

The methodology comprises of various segments including picture handling, trademark extraction, looking at pictures. The essential thing of approach is that we extricate the highlights based on which we will arrange the phony note. Security highlights of money are basic for deciding genuine and phony cash. Regular security highlights incorporate watermarks, idle pictures, security string, and optically factor ink.

In the study, a methodology for counterfeit money detection separates the general characteristics dormant pictures and ID mark from the picture of money. Extricating traits from pictures of money notes can get very mind boggling as it includes the extraction of some obvious and undetectable highlights of cash. After demonetization 500 and 2000 are the high esteemed money notes existing till date so there is a most extreme likelihood that this notes can be falsified so

as to dodge this we are utilizing programming to recognize the phony notes utilizing picture handling system.

II. RESEARCH MOTIVATION

Counterfeiting cash represents the illicit replication of unique currency; thus fake currency is a illegal currency that has not been approved by the government. Reserve bank of India (RBI) is the main body which has sole obligation to print currency notes in India. But RBI faces the issue of fake currency notes once sifted and coursed in the market consistently. Prior fake currency detection was finished by utilizing chemical properties of the currency paper. With the approach of computerized reasoning and image processing, advanced image processing is as often as possible utilized for fake currency detection by separating properties from images that speak to the highlights of currency.

Feature extraction is testing function as it includes the extraction of legitimately or in roundabout way unmistakable highlights of currency. Security highlights of a currency are basic for deciding genuine and fake monetary forms. Basic security highlights incorporate watermarks, idle images, security thread, intaglio, optically factor ink, smaller scale lettering and fluorescence [1].

In the proposed work, a methodology for fake currency detection is introduced that removes the general qualities, for example, shape, including the security thread, RBI logo and recognizable proof imprint from the image of the paper currency. Advanced Image Processing is a field that includes concentrating just as processing of images by removing properties from images and incorporates the acknowledgment of individual articles. Extricating properties for images of currency notes can get very unpredictable as it includes the extraction of some obvious and imperceptible highlights of currency.

III. LITERATURE REVIEW

L. Latha In market fake currency is the most important problem that speaks a lot. Due to the growth of technology, the fake currency production has been increased which degraded the economy of our country. Here the suggested method uses OpenCV to recognize whether the given note is original or fake. It consists of machine learning techniques that are carried out using suitable mechanisms.A fake currency detection method is introduced which uses the edge detection to detect the lines accurately and also accurately detect curves of acceptable notes. [9] Here we use a detector that is trained with the help of stored information which is similar to the one that is to be tested or compared later; within those modules, anchor lines are defined that are further depicted in subsequent test patterns. In order to provide training for the detector in offline a microprocessor is programmed.

This is done with an sample currency obtained by scanning given note into our proposed method, here a frame like design is obtained by training image format. Then, notes similar to obtained frame are to be identified. Inside the template, the microprocessor determines anchor lines that are further depicted in that test format; it spin and moves the design before it matches to the training format, so that anchor lines which corresponds to the line can be identified in that trained dataset i.e. the pattern designed; and compares them with the test format to know if those anchor lines lies inside that test format. The system is proposed in a way that it shows if the currency is fake or it is original. We all know that Currency occupies an important place in our existence and hence it is very important for us to check its uniqueness. This system is useful in India because they use the paper currencies more.

Akanksha Upadhyaya Counter feit currency is one of the threats which creates vice to nation's economy and hence impacts the growth worldwide. Producing forge currency or fabricating fake features in the currency considered to be a crime. Currency crime comes under the criminal law and known to be as Economical crime.

Over the past few years many researchers have proposed various techniques to identify and detect forged currency. The serious problem has been come up with variety of solutions in terms of hardware related techniques, Image processing and machine learning methods. Advancements in printing and scanning technology, trading of material are some of the problems in germinating counterfeit currency. The study presents various fake currency detection techniques proposed by various researchers. The review highlighted the methodology implemented on particular characteristics feature with success rate of each method to detect counterfeited currency. Moreover, the study includes the analysis of widely acceptable statistical classification technique for currency authentication. The comparative analysis of Logistic Regression and Linear Discriminant

Analysis (LDA) was performed to realize the better model for currency authentication. It has been found that classification Model using Logistic regression shows better accuracy of 99% then LDA. The study will benefit the reader in identifying most feasible technique to be implemented based on the accuracy rate.

P. Ashok Babu In this paper, we propose a system for currency recognition system and the detection of fake currency banknotes using image processing techniques. It is hard for people to perceive monetary forms from various nations. Our point is to help individuals with taking care of this issue. In any case, money acknowledgement frameworks that are in light of picture investigation are entirely not adequate. Our framework depends on picture handling and makes the procedure programmed and vigorous. Our aim to assist those folks that are not ready to recognize which country's currency note was. We use banknotes which are currency, may differ the size, texture, color. Our system helps in currency identification, which is a fake currency or not. In India,' currency' is Transaction, so there is more value for currency in our social and economic development. We have used MATLAB software to recognize other country currencies and fake currency.

Modernization within the money-related framework ensures financial improvement, and nowadays, the government has become cognizant about this. Hence, Rs 1000 and Rs 500 notes' demonetization is the foremost up-to-date case of it. However, we have Rs 2000 as another benefit showcase. In light of the top elevated worth note, quite possibly degenerate individuals will try to make it a fake. The real target of this project is to contemplate distinctive key highlights of recent certifiable money and utilize such systems to acknowledge and confirm new cash circled by India's depository institution. There are different strategies which are utilized to acknowledge fake notes and certifiable one. By utilizing various parts of Digital Image handling, such as picture preparing, Image Segmentation, feature extraction, and viewing pictures, we will then remove the highlights of certified notes. It is a problematic errand for recognizing counterfeit money.

Arya S Fake currency notes are increasing day by day, in order to overcome this we proposes a very helpful and efficient system to detect the fake currency. For detecting the fake currency note is done by counting the number of interruptions in the thread line. For predicting the note is real or fake on the basis of number of interruptions. If the number of interruption is zero, if it is real note otherwise it is fake. And also we calculate the entropy of the currency notes for the efficient detection of fake currency note. MATLAB software is used to detect the fake currency note.

Vaishak B Any development in technology is made with the intention of solving the difficulties in that field. One such identified problem is blind people were unable to make out the type of currency. The proposed model efficiently

identifies the type of currency. The converse of this leads to the printing and scanning of currencies and releasing them into the market, which not only affects the economy but also reduces the value for money.

This further causes some conflicts and a great threat to the country. Thus, a need for efficient currency and fake currency detection methods is required. Finding fake currencies is done by any ways. The proposed work identifies the currency's originality by examining its images. The code simulated using MATLAB extracts the features of currencies. Machine learning models are used for mapping the extracted feature to its standard value; it is able to identify the fake currencies efficiently.

Neeru Rathee Fake currency detection is a serious issue worldwide, affecting the economy of almost every country including India. The possible solutions are to use either chemical properties of the currency or to use its physical appearance. The approach presented in this paper is based upon physical appearance of the currency. Image processing algorithms have been adopted to extract the features such as security thread, intaglio printing(RBI logo) and identification mark, which have been adopted as security features of currency. To make the system more robust and accurate, the decisive score of all the three features has been fused to differentiate between real and fake currencies. The fake currency detection accuracy of the proposed system is 100%. Another parameter used to measure the performance of the proposed system is mean square error, which is approximately 1%. It may be adopted by the common people as well, who quite often face the problem of differentiating between real and fake currencies.

Anju Yadav The one important asset of our country is Bank currency and to create discrepancies of money miscreants introduce the fake notes which resembles to original note in the financial market. During demonetization time it is seen that so much of fake currency is floating in market. In general by a human being it is very difficult to identify forged note from the genuine not instead of various parameters designed for identification as many features of forged note are similar to original one.

To discriminate between fake bank currency and original note is a challenging task. So, there must be an automated system that will be available in banks or in ATM machines. To design such an automated system there is need to design an efficient algorithm which is able to predict weather the banknote is genuine or forged bank currency as fake notes are designed with high precision. In this paper six supervised machine learning algorithms are applied on dataset available on UCI machine learning repository for detection of Bank currency authentication. To implement this we have applied Support Vector machine, Random Forest, Logistic Regression, Naïve Bayes, Decision Tree, K- Nearest Neighbor by considering three train test ratio 80:20, 70:30 and 60:40 and measured their performance on

the basis various quantitative analysis parameter like Precision, Accuracy, Recall, MCC, F1-Score and others. And some of SML algorithm is giving 100 % accuracy for particular train test ratio.

Engdaw Ayalew Tessfaw Currency recognition is an important task in numerous automated payment services and used to categorize the banknotes of different nation. The importance of automatic methods for currency recognition has been increasing in the time being because of circulation of fake notes is increased in today's economy. This recognition system contains basic image processing techniques such like image acquisition, image preprocesses, extract features and classification using support vector machine. Basically camera or scanner used for image acquisition.

The images of currency processed using a variety of preprocessing techniques and different features of the image extracted using local binary pattern technique, once the features are extracted it is important to recognize the currency using effective classifier called Support vector machine and Finally a prototype able to recognize Ethiopian paper currency with accuracy of 98% shows high performance classification model for paper currency recognition and also verify the validity of given banknotes with average accuracy of 93% rate.

S.M Asha Banu The fake currency notes are detected using image processing employing MATLAB in this paper. This project aims in providing the best techniques in image acquisition, and image segmentation. The work uses CANNY's algorithm to extract the notes' features much more effectively. Algorithms for image processing are used to extract the options. The technique used here functions well with the recently introduced denominations of 500 and 2000. The recommended strategy provides a practical means of detecting fake currency that is supported by physical inspection.

P. Ponishjino In present scenario, the government has announced the demonetization of all Rs 500 and Rs 1000, in reserve bank notes of Mahatma Gandhi series. Government has introduced a new Rs 500 and Rs 2000, to reduce fund illegal activity in India. Even then the new notes of fake or bogus currency are circulated in the society. The main objective of this work is used to identify fake currencies among the real. From the currency, the strip lines or continuous lines are detected from real and fake note by using edge detection techniques. HSV techniques are used to saturate the value of an input image. To achieve the enhance reliability and dynamic way in detecting the counterfeit currency.

S. V. Viraktamath Many countries are affected by the matter of fake notes. With the improved technology, anyone can print fake notes. These notes are produced without legal sanction of the state and continues production of such kinds

of notes can degrade countries economy. When such counterfeited notes are produced and circulated, it becomes impossible for ordinary citizens to distinguish whether the money is real or fake because they differentiate according to physical appearance.

The biggest challenge for many countries like India is the detection of fake currency. Even if banks and other big organizations have automatic machines designed to identify counterfeit currency notes, ordinary people can hardly differentiate between them. Nowadays recognition of fake currency has become challenging issue for many researchers.

The identification involves many steps like edge detection, feature extraction, image segmentation, image acquisition, grayscale conversion, and comparison of images. This paper provides some related works of paper-currency recognition and has explained the spread of various currency recognition systems. Choosing the right feature would improve overall system performance. The goal of this work is to review previous papers and literature, identify the benefits and disadvantages of every method.

Adiba Zarin Currency duplication remains an emergent concern among nations due to the advancement of printing and scanning technology. Many note detection systems are present in banks but they are very costly and often inaccurate. The fields of image processing, neural network and machine vision have potential to significantly overcome this issue. This paper proposes a model comprised of Optical Character recognition (OCR), Face Recognition and Hough transformation algorithm. The microprinting, water-mark, and ultraviolet lines features of Bangladeshi notes are extracted for testing of genuine notes. The experimental results of the proposed model give accuracy as high as 93.33% which makes it suitable for deployment on a mobile application. Moreover, the obtained results are compared with the output from individual algorithm of OCR, Face Recognition and Hough transformation, to show that the proposed algorithm gives the highest accuracy.

Rencita Maria Colaco Now a days due to the development in color printing technology the rate of counterfeit notes production and distribution is increasing. This is a massive problem, faced by almost all the countries. It affects the economy, sine it compromises the security of the real economy. Such counterfeit currencies are used to fuel nefarious motives, usually involving terrorist activities. According to the research, developing countries like India have been impacted by this very negatively. Even after the steps taken in 2016 to remove the counterfeits, by executing the demonetization of 500 and 1000 rupees bank notes in India the counterfeits of the new notes have begun circulating. This is due to the highly advanced technology adopted by the counterfeiters which makes the tracking of these counterfeit notes hard. This has become a very critical

issue and the negative impact due to the counterfeit currency keeps rising. The only one solution for this problem for a common man is to detect the fake currency, by using the fake currency detector machine. These machines are used in banks and large scale business, but for a small business or for a common man these machines are not affordable. This paper gives the complete methodology of fake note detector machine, which is affordable even for a common man.

By implementing the applications of image processing techniques we can find out whether the currency notes are fake or not. Image processing technique consists of a number of operations that can be performed on an image, some of which include image segmentation, edge detection, gray scale conversion etc. The proposed system will have advantages like simplicity, reliability and costs less.

Sonali R. Darade In this paper, the automatic system is designed for identification of currency notes and check whether it is fake or original. The automatic system is very useful in banking system and other field also. In India increase in the counterfeit currency notes of 100, 500 and 1000 rupees. As increase in the technology like scanning, colour printing and duplicating because of that there is increase in counterfeit problem. In this paper, recognition of fake currency notes is done by using image processing technique.

Aman Bhatia This paper deals with the matter of identifying the currency that if the given sample of currency is fake. Different traditional strategies and methods are available for fake currency identification based on the colors, width, and serial numbers mentioned. In the advanced age of Computer science and high computational methods, various machine learning algorithms are proposed by image processing that gives 99.9% accuracy for the fake identity of the currency. Detection and recognition methods over the algorithms include entities like color, shape, paper width, image filtering on the note.

This paper proposes a method for fake currency recognition using K-Nearest Neighbours followed by image processing. KNN has a high accuracy for small data sets making it desirable to be used for the computer vision task. In this, the banknote authentication dataset has been created with the high computational and mathematical strategies, which give the correct data and information regarding the entities and features related to the currency. Data processing and data Extraction is performed by implementing machine learning algorithms and image processing to acquire the final result and accuracy.

IV. CONCLUSION

In this study, we discuss various currency detection techniques and currency security feature; everybody has its own centrality. By using said technique we have watch that

extraordinary results can be gotten quickly what's more, viably. The upsides of this assessment for the per user are that this study will give information about the particular systems what's more, calculations used for counterfeit currency detection system.

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