A STUDY ON INDIAN FAKE CURRENCY DETECTION

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Abstract: Counterfeit currency detection is a major issue around the world, influencing the economy of pretty much every nation including India. 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.

Index Terms **- 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 Indian 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 Indian 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. LITERATURE REVIEW

The approaches of picture preparing based extraction of the current highlights of banknotes are delineated in subtleties to show the attainability of programming helped fake cash location framework. For Indian monetary orders following highlights are considered. Here, for testing reason Indian money has taken parameters they utilized was:

1) Micro-printing 2) Watermark 3) Optically Variable Ink 4) Iridescent Ink 5) Security Thread 6) Ultraviolet Lines.

Zahid Ahmed et...al; The proposed approach separates different highlights from Indian cash and uses them for counterfeit money location. The picture was gained utilizing picture obtaining gadget. The security highlights were extricated utilizing different picture handling calculations and afterward layout coordinating was done to distinguish counterfeit money. We will beat this issue by utilizing various parameters which will be sufficient adequate to perceive the contrast among phony and unique cash takes note of, this will be executed utilizing picture handling systems.

Hariri et...al; Iranian banknote ID should be possible through utilizing wavelet change and neural system. This strategy utilizes wavelet change to extricate picture highlights. The proposed technique comprises of two stages: In the principal stage, a pre-procedure of the picture is taken and its size is diminished and RGB picture gets dark. Removed data can be utilized as contributions to the neural system.

Hassanpour,H et...al; Indian is a developing country, Production and printing of Fake .In this article, recognition of paper currency with the help of digital image processing techniques is described. Around eight characteristics of Indian paper currency is selected for counterfeit detection. The identification marks, optical variable link, see through register and currency color code decides the currency recognition. The security threads, water mark, Latent image and micro-lettering features are used for currency verification. The characteristics extraction is performed on the image of the currency and it is compared with the characteristics of the genuine currency.

R.C.Gonz alez et...al; The extension of present day banking administrations requires the requirements for programmed money acknowledgment and verification framework, consequently reassuring numerous scientists to grow high exactness, dependable and high handling speed methods. To recognize the validness of money note there are two techniques for example first line investigation strategy and second line review technique. First line review strategy incorporates differed thickness watermarks, bright fluorescence, intaglio printing, miniaturized scale content and multi dimensional image while the second line examination techniques incorporate isocheck/isogram, fiber based testaments of genuineness, shading and highlight investigation.

Mriganka Gogoi, et al; Money is a vital piece of our needs so its truly is significant. Flow of phony cash can upset the financial development procedure of our nation. Course of phony cash makes a lot of burden individuals. Numerous individuals are as yet not mindful of how to identify counterfeit notes and the measures which are to be thought about. Right now are concentrating on a propelled portable based application that is utilized to recognize counterfeit cash. Utilization of Counterfeit is to engage the basic man with an effectively accessible gadget to assist him with distinguishing counterfeit notes. This application can be utilized on everyday premise by us for recognizing deceitful cash notes without further ado. Dissimilar to existing cash indicators in banks, Counterfeit: Currency Detector will give easy to use and convenient application to discover produced banknotes.

III. METHODOLOGY

Being roused by the ongoing improvements in the field of picture preparing and accessibility of ease picture procurement gadgets, we present a methodology for counterfeit money discovery dependent on picture handling. The proposed approach separates various highlights from Indian cash and uses them for counterfeit money discovery. The diagram of the proposed work is introduced in framework design.

The image is procured utilizing picture obtaining strategy. The security highlights are removed utilizing different picture handling calculations and afterward format coordinating is done to recognize counterfeit money. The oddity of the methodology is in picture handling applied for extraction of security highlights from the given picture of cash. Another oddity is to utilize various securities includes as opposed to the single component.

A. Currency Features

The features extracted so far might be classified as general features. The general features are essentially application independent features, for example, surface, shading and differentiation, and shape. Counterfeit money detection system differs relying upon explicit features of notes of a nation.

For Indian notes following features are considered:
- Latent Image
- Identification Marks

Latent Image

Identity Marks

Latent Image

Identity Marks

Feature extraction refers to the retrieval of information about the image by applying image processing algorithms. The images of a currency note were acquired using a digital camera or scanning the currency

using a scanner. After acquiring the image, first pre-processing and then feature extraction is done to extract features. Both the steps are described in this section:

a. Pre-Processing:

In pre-processing the operations normally initial to main data analysis and extraction of information. In this unwanted distortion are suppressed and enhance some image features that are important to further processing. It includes image adjusting and image smoothening. After these two pre-processing steps, the images of the currency were applied for feature extraction.

b. Feature Extraction:

Feature extraction employs the selection and extraction of some of the Effective and important features, among the largest data set of the features which are extremely important for the recognition of fake currency. Some Features of an image are Latent image and Identification Mark. We first create a database of a number of authentic Indian notes and then extract their features. The extracted features are used for detection of fake currency.
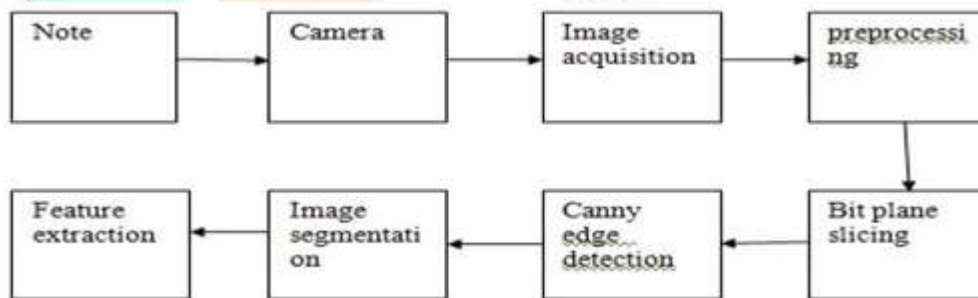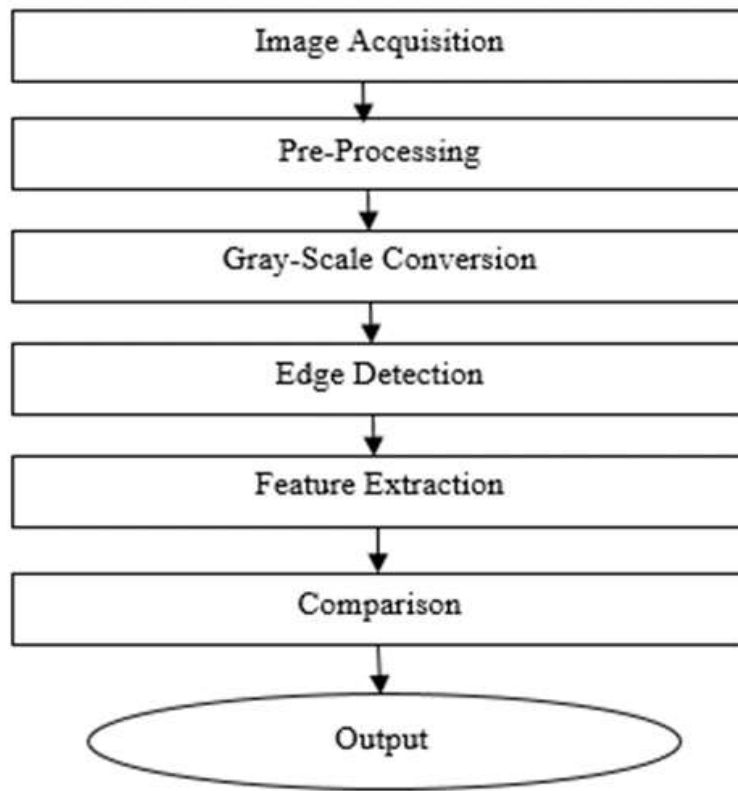
B. System Block Diagram

Fig.1: System Block diagram

C. Steps of Implemented System

Image processing based currency detection technique consists of few basic steps like image acquisition, its pre-processing and finally recognition of the currency.

Image processing generally involves five steps:

    i. Image Acquisition: Importing an image with a webcam.
    ii. Performing Image pre-processing techniques such as:
- Image Adjusting: Reduces the calculations and complexity of the size of the image and used for rotating, zooming, shrinking and for geometric corrections.
- Image Smoothening: Reduces the noise introduced in the image.

    iii. Detect the edges of the note and partition it from the surrounding background of the image.
    iv. Perform feature extraction on the note to detect whether the note is real or fake by comparing the features of the note with the stored database.
    v. After feature extraction, the application will detect and recognize the note. The final result will be an output.

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│     Image Acquisition       │
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│       Pre-Processing        │
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│    Gray-Scale Conversion    │
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│        Comparison           │
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        │   Output    │
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D. The Major Units of this Proposed System

K-means Algorithm

K-means algorithm is a strategy for vector quantization, initially from signal handling, that is main stream for group examination in information mining. K-means clustering intends to parcel n perceptions into k clusters in which every perception has a place with the group with the closest mean, filling in as a model of the bunch.

The algorithm has a free relationship to the K-means cluster classifier, a well known AI strategy for characterization that is frequently mistaken for k-means as a result of the k in the name. One can apply the 1-closest cluster classifier on the group communities acquired by k-intends to order new information into the current bunches. This is known as closest centroid classifier or Rocchio algorithm.

SVM Algorithm

In machine learning, support vector machines (SVMs, likewise support vector systems) are administered learning models with related learning calculations that investigate information utilized for grouping and relapse examination. Given a lot of preparing models, each set apart as having a place with either of two classes, a SVM preparing calculation constructs a model that allots new guides to one class or the other, making it a non-probabilistic paired direct classifier (despite the fact that strategies, for example, Platt scaling exist to utilize SVM in a probabilistic grouping setting). A SVM model is a portrayal of the models as focuses in space, mapped with the goal that the instances of the different classifications are partitioned by an unmistakable hole that is as wide as could be allowed.

In addition to performing linear classification, SVMs can efficiently perform a non-linear classification using what is called the kernel trick, implicitly mapping their inputs into high-dimensional feature spaces. When data are not labeled, supervised learning is not possible, and an unsupervised learning approach is required, which attempts to find natural clustering of the data to groups, and then map new data to these formed groups. The clustering algorithm which provides an improvement to the support vector machines is called support vector clustering and is often used in industrial applications either when data are not labeled or when only some data are labeled as a pre-processing for a classification pass.

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.

V. REFERENCES

[1] Zahid Ahmed, Sabina Yasmin, Md Nahidul Islam, Raihan Uddin Ahmed "Image Processing Based Feature Extraction of Bangladesh Banknotes".

[2] Hassanpour,H., Yaseri, A. and Ardeshir G.: "Feature extraction for paper currency Recognition" In International Symposium on Signal Processing and its Application (ISSPA) Sharjah.

[3] R.C.Gonz alez and R.E.Woods, Digital Image Processing,2nd ed.,Prentie Hall,2002 B.Manjunath and W.Ma,"texture features for browsing and retrieval of image data,"IEEE Trans.Pattern Anal .

[4] Mriganka Gogoi, et al.,"Automatic Indian Currency Denomination Recognition System based onArtificial Neural Network", 978-1-4799-5991-4/15©2015 IEEE.

[5] Hariri, Elham. Hariri,Mahdi . "Persian Banknote detection methods and its imperfections identifies."

[6] Amol A. Shirsath, S. D. Bharkad, A Review of Paper Currency Recognition System, IOSR Journal of Computer Engineering (IOSR-JCE) e-ISSN: 2278-0661, p- ISSN: 2278-8727Volume 10, Issue 1 (Mar. - Apr. 2013).

[7] N. Manoharan, Counterfeit Currency as a Threat to Indias Internal Security.

[8] Shital Mahajan & K.P.Rane. "A Survey on Counterfeit Paper Currency Recognition and Detection." in International Conference on Industrial Automation and Computing (ICIAC), April 2015.

[9] N. Rathee, A. Kadian, and R. Sachdeva, "Feature fusion for fake Indian currency detection," Computing for Sustainable Global Development (INDIACom), 2016 3rd International Conference on IEEE, 2016.

[10] Sanjana, Manoj Diwakar, Anand Sharma, "An Automated recognition of Fake or Destroyed Indian currency notes in Machine vision", IJCSMS, Vol. 12, April 2012.

[11] Ms. Achal Kamble, Prof. Mrudula Nimbarte, "Fake Indian Currency Detection: A Review" in International Journal of Pure and Applied Mathematics, Volume 118 No. 24 2018.

[12] Gouri Sanjay Tele et al." Detection of Fake Indian Currency" in International Journal of Advance Research, Ideas and Innovations in Technology, Volume 4, Issue 2, 2018.