

# DEVELOPING AN AUTOMATED COUNTERFEIT CURRENCY RECOGNITION SYSTEM BY EMPLOYING SVM WITH NOTE TO COIN EXCHANGER FEATURE

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Received: 10<sup>th</sup> February, 2020; Accepted: 15<sup>th</sup> March, 2020; Published: 22<sup>nd</sup> April, 2020

## ABSTRACT

The normal citizens are the most noticeably terrible hit as fake banknotes have gotten so profoundly inserted in the Indian economy that even banks and ATMs are dispensing fake cash. From nearby vegetable merchant to the petroleum product vendors, everyone is concerned about tolerating monetary certificates in the group of Rs.100, Rs.500 and Rs.2000 as a huge number of fake Indian currency notes are practically difficult to separate from real currency. So as to manage such sorts of issues, a computerized Recognition of cash notes is presented with the assistance of highlight Extraction, using SVM. SVM characterizes the fragments utilizing its datasets. This method is considered with the machine vision where all the handling with the picture is done by machine. Just as Requirement of coins is expanding at places like transport stand, railroad station, shopping center and park. The principle intention behind the undertaking is to structuring a productive and basic machine fake cash acknowledgment which will satisfy need of coins for exchanges so individuals won't face issue of coins. This undertaking is to give coins to real notes, for this reason, we have created a mechanical coin administering a model in which the camera takes an image of note. After that, it's discovering its worth utilizing picture preparing method and afterward as per the worth proportional number of coins is dispensed.

## I. INTRODUCTION

Counterfeit currency is impersonation money delivered without the lawful authority of the state or government creating or utilizing the phony cash is a type of misrepresentation or fraud. The Reserve bank of India evaluates that there is at any rate Rs.2 trillion of phony rupees note available for use all over India. RBI faces the issue of Counterfeit Currency notes or devastated noticed each year. The bank staffs are uniquely prepared to recognize fake notes however the issue starts once such notes are penetrated into the market and flowed through daily users. In any event, getting fake notes from ATM counters has likewise been accounted for in

certain spots. Because of the incredible innovation come signs of progress in shading printing and examining duplicating issues become increments from the previous not many years. In the past, just the printing house can make paper cash, yet today printing houses, as well as any individual, can print fake monetary orders basically by utilizing a PC and a laser printer at the house. In this manner to stop these issues programmed Fake cash discovery framework has become increasingly more significant. The phony cash discovery framework is created to distinguish counterfeit money by applying various strategies and techniques on money notes. The phony cash recognition frameworks can be utilized in spots, for example, a

bank counter, shops, and computerized teller machines, auto dealer machines, and so on. It is a significant assignment to arrange the paper monetary forms at banks or enormous shops rapidly and effectively. Up until this point, various methodologies have been proposed to take care of the issue of paper cash acknowledgment and confirmation.

Programmed counterfeit note review framework is the best comparator to human vision examination. Including picture preparing, PC innovation, and example acknowledgment, Embedded System, NN, SVM, every one of these frameworks can give the dependable, goal and smooth execution on counterfeit note recognition. Our objective is, accordingly, to contemplate the issue of extortion in banks and its goals by the SVM methods. SVM arranges the sections utilizing its datasets. This SVM system is considered with the PC vision where all preparing with the picture is finished by machine.

The machine is fitted with an I-Ball C8.0 camera which will filter the picture of the currency note considering the elements of the banknote and programming will process the picture sections with the assistance of SVM and character acknowledgment techniques. Right now, I have made phony money note identification methods utilizing MATLAB and highlight extraction with different utilizations of picture preparation. MATLAB is the computational apparatus of decision for research, advancement, and investigation. Trademark extraction of pictures is testing work in advanced picture preparation. It includes the extraction of some imperceptible

noticeable and highlights of Indian cash notes. In the venture arrangement, the note is put before the camera to check whether it is phony or real. The camera takes the photos of notes and broke down by MATLAB program introduced on the PC and check Indian cash notes. The task is intended to check Indian money notes of 10, 20, 50, 100, 500 and 2000 rupees. On the off chance that the note is real, at that point, the individual message is showed up on the screen and the other way around. From that point onward, as indicated by the client input the identical number of coins will apportion.

## II. TECHNIQUES FOR DETECTING COUNTERFEIT CURRENCY

### a) Varied-Density Watermarks

By shifting the thickness of the paper a banknote is imprinted on in a controlled way, slight watermarks can be applied. These all are discernible when a brilliant light sparkles onto the back of the banknote, and the changed paper thickness makes shifting powers of light go through it, causing the watermarked picture is showing up on the opposite side of the note.

### b) Ultraviolet Fluorescence

Installing fluorescent fibre into the paper, or printing by bright ink on to the paper, makes a type of optical confirmation handily utilized at counters. By presenting the note to ultra-violet light, the ink or fibre fluoresce, uncovering a hued design not obvious under common light.



Fig.1: Watermark image of 100 rupee Note

### c) Intaglio Printing

The note is exposed to a high-pressure printing process that fortifies and marginally raises the paper's surface structure. Utilizing the distinctive arrangement of the line imprinted right now, the inactive picture can be created which is changes the appearance relying upon the edge at which the note is seen.

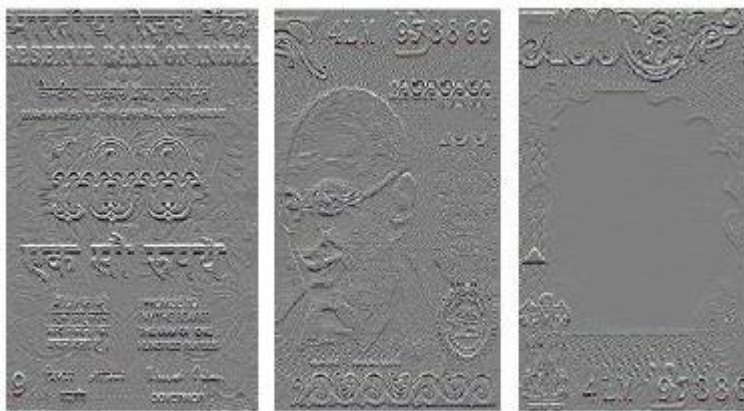


Fig.2: Intaglio and Identification Mark

### d) Micro text

Content printed at littler than 1-point size, intelligible just with the amplifying glass. It gives extra security to coupons, solicitations, and other extortion delicate applications. Perfect with monochrome, shading, and feature shading gadgets.

## III. MODELING APPROACH

### A. Software Designing

1)I-Ball C8.0 camera: We are utilizing I-ball USB camera for picture procurement with High Quality CMOS sensors, 8 M pixels despite everything picture goals, 4 M pixels' video goals, High quality 5G wide-edge focal point, USB 2.0 Interface, 4x Digital zoom, Video Format: RGB 24 piece, Video Resolution: 640x480, 1600x760,1280x960, 1280x1024,1600x1200, 2304x1728 and Frame Rate of 30 Frames for each second. The pictures are taken under no impediment or shadowing is there and the picture is taken in a perfect situation. The separation of the camera is almost fixed from the item and inside a little scope of variety. The direction of the money notes was to such an extent that the adequate measure of information required for additional preparing of even a solitary face was in any event obvious. The cash notes are of acceptable quality for example they are not particularly loaded with stains.

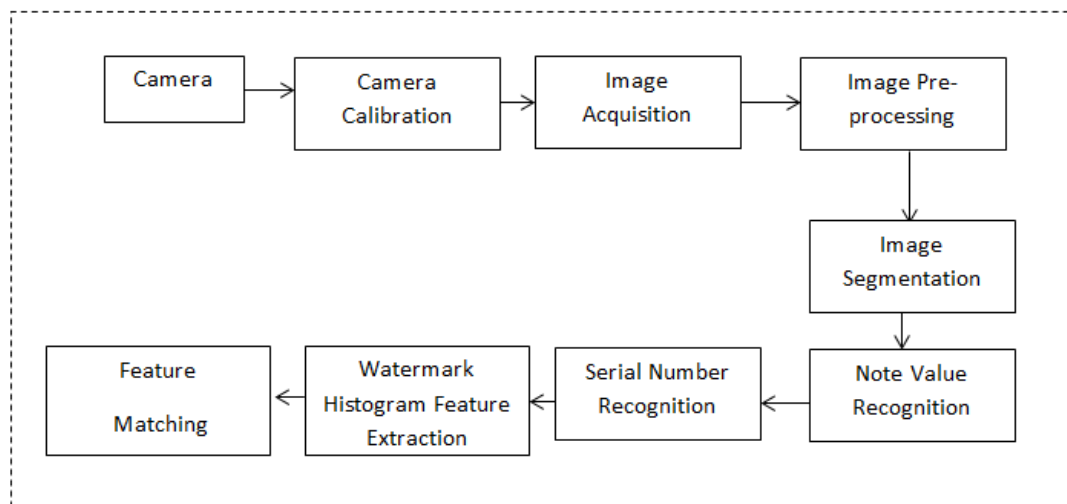


Fig.3. Block Diagram Of Counterfeit Currency Detection

2) Picture obtaining: The principal phase of any vision framework is picture procurement. After the picture has been gotten and different strategies for preparing can be applied to the picture to play out the wide range of vision errands. Be that as it may, in the event that the picture has not been gained appropriately, at that point the expected undertakings may not be feasible even with the guide of some type of picture upgrade. Right now securing is finished utilizing the camera. Hardly any inbuilt elements of MATLAB are utilized to obtain a picture.

3) Picture pre-preparing: Pre-processing is done to build the nature of the picture to be handled. Right now decrease is finished utilizing inbuilt elements of MATLAB. This is fundamental for the additional preparation of the picture. Likewise, histogram alteration is done right now. Histograms are a graphical portrayal; it is like a bar outline in a structure that composes a gathering of information that focuses on client characterized ranges. The histogram consolidates an information arrangement into an effectively deciphered visual by taking numerous information focuses and gathering them into sensible ranges or canisters. Histogram modification is done to expand the clearness of the picture.

4) Segmentation: Picture division is the way toward parcelling an advanced picture into numerous fragments. The objective of picture division is to rearrange or potentially change the portrayal of a picture into something that is increasingly important and simpler to break down. Picture division is utilized to find limits items and pictures. Picture Segmentation is the way toward doling out a mark to each pixel in a picture to such an extent that pixels with a similar name share certain qualities. Its consequence is a lot of sections that all in all spread the whole picture. Every one of the pixels right now comparative as for some trademark and registered property, for example, force, surface, and shading. Adjoining locales are essentially extraordinary regarding a similar trademark. Division intends to partition the picture into locales. Out of various areas the locale of intrigue is chosen for handling.

5) Note Value Recognition: After division various locales are chosen for preparing to separate the highlights of notes. Separating the highlights of center district and utilizing image acknowledgment note esteem is resolved.

6) Sequential number acknowledgment: After division sequential number on the upper right corner of the note is perceived. Sequential number

is additionally decided utilizing image acknowledgment.

7) Watermark histogram include extraction: Watermark is an unmistakable picture or example in paper that shows up as different shades of gentility/obscurity when seen by transmitted light brought about by thickness or thickness varieties in the paper. Watermarks have been utilized on cash, postage stamps and other government archives to dishearten falsifying. There is watermark of Mahatma Gandhi on cash note. So it is recognized after division. Watermark histogram highlights are separated to coordinate the watermark with Gandhi's representation.

8) Highlights coordinating utilizing SVM: SVM is another factual learning strategy that can be viewed as another technique for preparing classifiers dependent on outspread premise capacities, splines, neural systems, polynomial capacities or different capacities. SVM utilizes a hyper-direct isolating plane to make a classifier. For issues that can't be straightly isolated in the info space, the machine will offer a likelihood to discover an answer by making a non-direct change of the first information space into a high dimensional component space, so ideal isolating hyper plane can be found. Those isolating plane is ideal, that implies a maximal edge classifier concerning the preparation informational index can be acquired. Here backings vector machines (SVM) are utilized targeting deciding the area of choice limits that produce the ideal division of classes. The entire example set comprising of certified just as copy tests is partitioned into barely any subsets. A fourfold test is directed with the goal that every subset shows up at any rate once as in approval, preparing, and testing.

#### B. Hardware Designing

The whole framework depends on correspondence between the PC with MATLAB and the processor. Fig.4 shows PC with MATLAB, which is utilized for picture handling and to actualize User Interface runs on the PC. Correspondence with the processor is finished utilizing sequential correspondence.

Processor is utilized to control the procedure. Crafted by processor is to decipher information from counterfeit note identification unit to check if money is phony, control and synchronize the note to coin exchanger component. Control capacities are performed by LPC 2138 and picture handling by MATLAB. Pc with Matlab is given the data that note place by the client is real or phony note. When the note is under the camera, information will be sent sequentially to MATLAB to begin catching the picture of the note and do the picture preparing in MATLAB.

The picture gained is RGB picture and afterward, it will be changed over into Grayscale than the Edge location of the entire Grayscale picture will be performed. In the wake of distinguishing edges, the attributes of the paper cash will be edited and fragmented. From that point onward, the qualities of the paper money will be removed. The attributes of the test pictures are contrasted and the first picture (pre-store) in the framework. On the off chance that the test picture coordinates with the pre-put away picture, at that point the money is authentic else it is fake cash. On the off chance that the note is set by the client is veritable, the individual message is showed up on the graphical UI (GUI) and the other way around. As per the necessary client can give the contribution through Matlab. USB to sequential converter is utilized for the client to machine correspondence. Processor advancement board to control the general working of the undertaking. The processor controls all engine activity and it speaks with MATLAB running on the PC. Coin Container unit comprises of transfers to drive the engines and the engine is let out the coins to the client. If there should arise an occurrence of blend coins, the controller is checked for accessibility of coins in the coin compartment and afterward according to the needs of the client from the catches the blend coins are let out to the client. In the event that the coins according to the need of the client are absent in the coin holder, at that point the "Inadequate COINS" message is shown on the LCD screen.

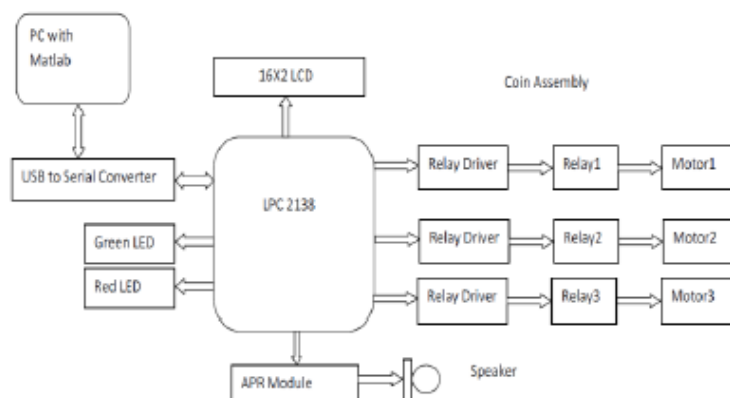


Fig.4. Block Diagram of Note to Coin Exchanger with counterfeit note detection

**IV. EXPERIMENTAL RESULT**

in this section, test the presence of the proposed strategy on a lot of some Indian banknotes. Right now are certifiable and some are fashioned. We haphazardly pick not many authentic notes and barely any manufactured note for testing. Fig. 4. Shows the procedure for recognizing Indian money. This strategy utilizes four qualities of cash including ID mark, watermark, note size, sequential number of the note. One's note is identified as a certifiable note, according to assist necessity of the client, the procedure can be stopped or it very well may be proceeded for administering of coins.

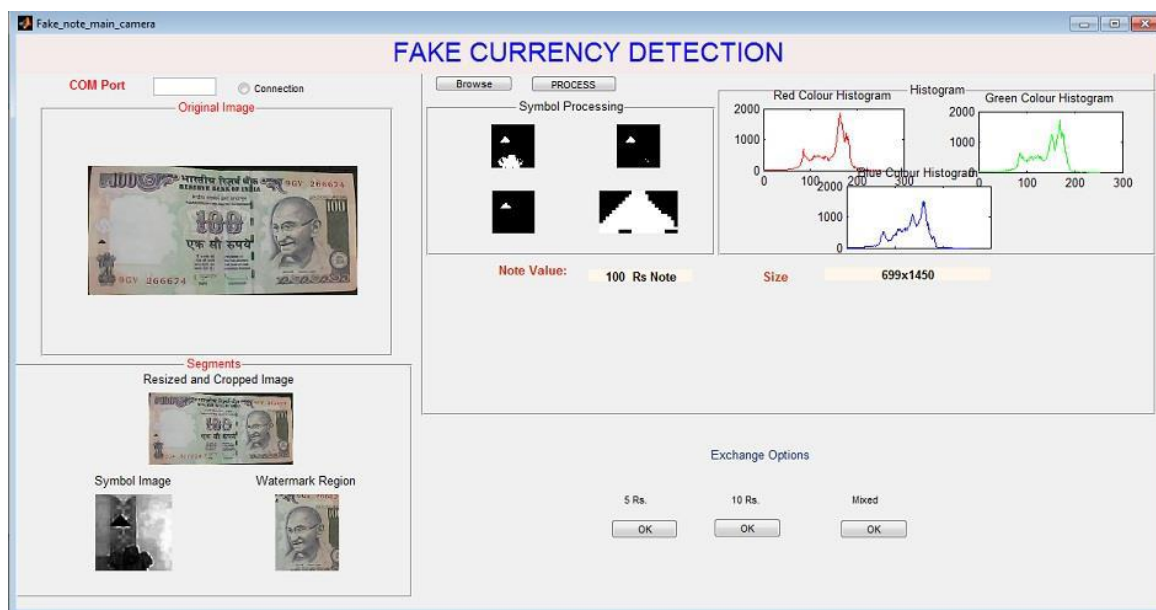


Fig.5: Simulation Result

**V. CONCLUSION**

The principle intention behind this is to introduce the framework dependent on the acknowledgment of fake money banknotes to maintain a strategic distance from misrepresentation. The note esteem is recognized by utilizing the database. From that point forward, Identification Mark, Note Size, Serial Number and Watermarked district are separated by utilizing the division strategy and the RGB histogram is plotted for the watermarked area. The proposed framework will be useful in the everyday existence of each regular man where individuals need to languish over the change in numerous open spots.