

# FAKE CURRENCY DETECTION USING IMAGE PROCESSING

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## ABSTRACT

*Programmed identification and acknowledgment of Indian money note has picked up a ton of research consideration as of late especially because of its inconceivable potential applications. Advancement in technology leads towards many automated systems which are capable of performing tasks without interference of humans. Money deposit machines, automatic ticket machines are one of such automated systems. In such systems it is necessary to identify the counterfeit and denomination of currency automatically. But available automated currency detection system uses computers and other processors which are bulky in size and cost of the overall system is also more. So it is necessary to develop a system which is capable of identifying the denomination of currency for small scale applications.*

**Keywords:** Raspberry Pi, Pi camera, LCD display, buzzer.

## INTRODUCTION:

There are approximately 50 currencies all over the world, with each of them looking totally different. For instance the size of the paper is different, the same as the colour and pattern. The staffs who work for the money exchanging (e.g. Forex Bank) have to distinguish different types of currencies and that is not an easy job. They have to remember the symbol of each currency. This may cause some problems (e.g. wrong recognition), so they need an efficient and exact system to help their work. As we mentioned before, the aim of our system is to help people who need to recognize different currencies, and work with convenience and efficiency.

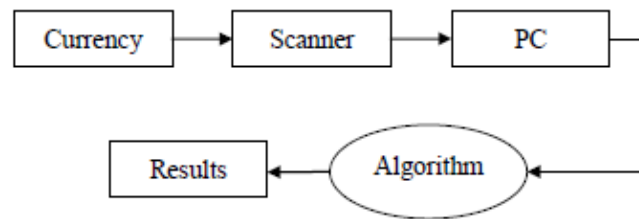
For bank staffs, there is a “Currency Sorting Machine” helps them to recognize different kinds of currencies. The main working processes of “Currency Sorting Machine” are image acquisition and recognitions. It is a technique named “optical, mechanical and electronic integration”, integrated with calculation, pattern recognition (high speed image processing), currency anti-fake technology, and lots of multidisciplinary techniques. It is accurate and highly-efficient. But for most staffs, they have to keep a lot of different characteristics and anti-fakes label for different commonly-used currencies in their mind. However, each of them has a handbook that about the characteristics and anti-fakes labels of some less commonly-used currencies. Even for that, no one can ever be 100 per cent confident about the manual recognition.

Otherwise our system is based on image processing, techniques which include filtering, edge detection, segmentation, etc.

### Relevance:

The system is based on scanner, PC, and algorithm. The aid of the algorithm is located in

the unique figure, RGB to Gray, image binarization, noise elimination, segmentation, pattern matching, etc. We realize there by programming with PYTHON. Flowchart of the system is described in Figure 1, Flowchart of the process.



**Figure 1. Flowchart of the process.**

The image we get from scanner is formatted by JPEG. JPEG (Joint Photographic Experts Group) is a standard for destructive or loss compromising for digital images. When you save the image as JPEG, the image will lose some information, and this cannot be recovered.

**Image Scaling** The first algorithm that is performed in our pro-gram is image scaling, which simply takes the input image and resize to 100 dpi (using the scaling factor  $s$ ) for obtaining a more desirable KNN for classification. This is achieved using nearest neighbor interpolation. For each destination pixel in the destination image, we use a scaling transformation to map that pixel to a pixel in the source image. However, this pixel does not have to be an integral value, so to get the non-integral value of the pixel from the source image, we use nearest-neighbour interpolation – essentially using the value of the pixel closest to our non-integral source pixel. Due to the way how Windows handles scaling with nearest neighbour interpolation, this might lead to a poor correlation result as illustrated by our demonstration and data analysis. Nevertheless, this step is essential to the completion of our system because our match filter is not scale invariant; therefore we have to make sure that the images that we are analyzing are the same resolution as the images in our reference database.

## LITERATURE REVIEW:

Fake Indian Currency Note (FICN) is a term used by officials and media to refer to counterfeit currency notes circulated in the Indian economy. In 2012, while responding to a question in parliament, the Finance Minister, P. Chidambaram, admitted that there is no confirmed estimate of fake currency in India. However, several central and state agencies are working together, and the Ministry of Home Affairs has constituted the Fake Indian Currency Notes Co-ordination Center (FCORD) to curb this menace.

On 8 November 2016, Prime Minister of India, Mr. Narendra Modi announced that the hitherto existing 500 and 1000 rupee notes cease to be legal tender. He said that the move is taken to curb black money and widespread counterfeit currency in the country. He introduced new ₹500 and ₹2000 notes, and discontinued the hitherto existing ₹1000 note.

Although fake currency is being printed with precision, the Crime Investigation Department (CID) says that they can be detected with some effort. Currency printed by local racketeers can be detected easily as they use the photographic method, hand engraved blocks, lithographic processes

and computer colour scanning. In counterfeit notes, the watermark is made by using opaque ink, painting with white solution, stamping with a dye engraved with the picture of Mahatma Gandhi. Then oil, grease or wax is applied to give the picture a translucent feel. In genuine notes, the security thread is incorporated into the paper at the time of manufacture. But in fake notes, the security thread is imitated by drawing a line with a pencil, by printing a line with grey ink, or by using aluminium thread while pasting two thin sheets of paper. Forgers find it difficult to reproduce the same shape of individual numbers again and again with accuracy. The alignment of figures is also difficult to maintain. Spreading of ink, smaller or bigger number, inadequate gaps, and different alignments in numbers should be regarded with suspicion. In counterfeit notes, the printed lines will be broken and there may also be ink smudges. In recent times it has been reported that FICN match 10 out of 14 security parameters adopted by the Indian government, with suggestions that the highest quality fakes could have only been produced by a nation state

Fake Indian notes are mainly used in terror related activities. The money mainly flows from Nepal, Pakistan and Bangladesh. The terrorists are using it to cripple the Indian economy and to create economic terror. Fake currency is a tactic of Econo-Jihad of terrorist groups around the world. Millions of Dollars are sent to India from different bordering countries. ISI is reportedly involved in this racket. Dawood Ibrahim is the main operative as the notorious don has a big the crime and narco network spread inside India.

Looking through the previous projects done in 18-551, we did not find any project that addresses the issue of counterfeiting. Nevertheless there have been a number of projects that deal with detection and classification. "Where's the Ball?" from Spring 2004 and "Face Detection for Surveillance" from Spring 2002 are some of the projects that fall into the category above. Some of the techniques that we considered are previously investigated by some the other groups; for instance blob labeling, linear correlation, KNN (peak to side-lobe ration), geometric moments, and morphological processing. However in terms of linear correlation, our project is slightly different because we correlate through the entire image while the other groups run correlation on small areas containing dominant identifying features, such as people's faces. As for details of work done previous in the industry, Adobe PhotoShop CS digital editing package includes a counterfeit deterrence system designed to prevent users from accessing images of currency.

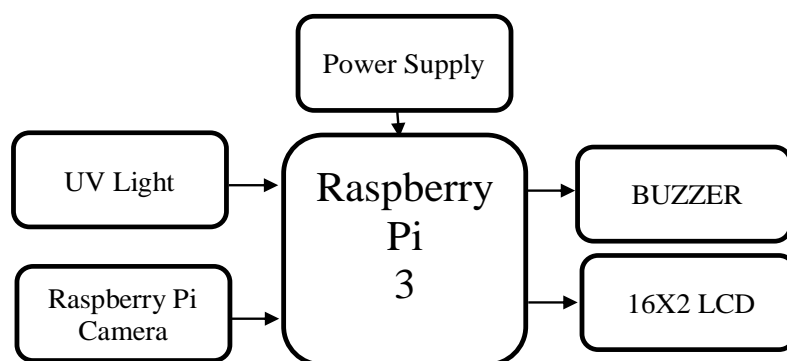
When the deterrence system detects an attempt to access a currency image, it automatically aborts the operation, displaying a warning message and directs the user to a website with information on international counterfeiting laws. This anti-counterfeiting system actually exceeds the requirement of U.S law which allows color reproductions of U.S. bank notes so long as the reproductions are smaller than 75 percent or larger than 150 percents of actual size. Some other companies with similar products actually voluntarily embed features of anti-counterfeiting similar to that of Adobe to support the counterfeiting laws because cases of counterfeit crime have soared tremendously in the recent years. Despite the similarity in concepts, the purpose of our project is actually very different from those of what exist in the industry nowadays. Our program prevents people from acquiring images of prohibited objects while most of the programs out there either prevent people from modifying an image or leave traces of where the printouts are made. To further emphasize the difference, our project aims to stop people from scanning or copying images of treasury notes, thereby fundamentally eliminating counterfeiting by targeting the root of this crime.

Audio output is designed for the visually challenged people. The audio output is generally fed to an ear phone through which the color and the face is recognized and the output is given through the earphone. The raspberry pi 3 module is used to run the open cv software. This module works on a 30-200Mhz processor. It can be charged using a normal mobile phone charger. This module is preferred because it is lesser in dimension and more over it is portable for the visually challenged. Many applications have been in use in various fields.

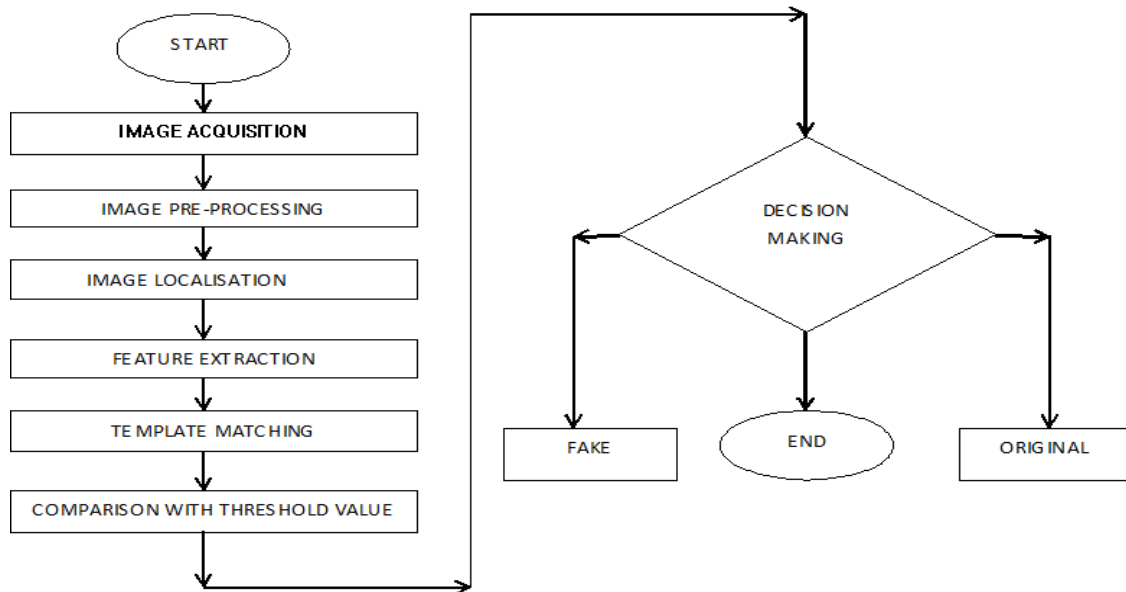
As the proposed independent mechanized printing framework contains validation module, fake cash identification sensor and a mechatronics setup for keeping the cash, in this Chapter right off the bat we are checking on the confirmation and fake Currency discovery strategies Aand afterward giving the short study about the actualized computerized printing framework previously.

## PROJECT IMPLEMENTATION

Fig. shows block diagram of the system. Here the proposed system will continuously capture the image from web camera and identify the fake note in the capture with the help of Raspberry pi processor. It also recognize the note by comparing with database and recognized or unauthorized.



**Fig2: Block Diagram of Detection of Image Processing**



**Fig3: Flowchart of Proposed System**

## METHODOLOGY:

The proposed system suggested new method for image processing based on the following steps:

1. Picture securing
2. Picture pre-handling
3. Picture limitation
4. Highlight extraction
5. Layout coordinating
6. Examination with limit values

### Picture securing:

Picture securing is a procedure of procuring a picture with the assistance of gadget, the obtained picture is put away for further handling. Here the picture is procured with an advanced web camera. For picture procurement its important to compose a practical code for web camera, once the utilitarian code is composed the web camera now works as indicated by code and this code can be utilized to choose the quantities of snaps to be taken of a cash and furthermore it will choose the shading organization of picture whether it ought to be shading or grayscale picture.

### Picture pre-handling:

Picture pre-handling is done to improve some picture highlights essential for further preparing and investigation. In picture pre-handling size of the picture is decreased and clamor is expelled that may have showed up in the picture while catching. Resizing: The measure of the picture is diminished by utilizing PYTHON work 'imresize'. Removing commotion: When picture is caught there are INALISZE PROJET chances that picture get obscured and clamor

might be added to the picture and it's fundamental this ought to be evacuated and picture ought to be smoothened.

### Picture limitation:

At the point when web camera catch the picture of money then the picture contains foundation kept up beneath cash, for preparing of a picture and to get right outcomes it is important to expel the foundation and keep the picture of cash as it may be. This can be accomplished by utilizing edge recognition and sweep line calculations in PYTHON.

### Highlight extraction:

Utilizing highlight extraction strategy it is conceivable to extricate the element of accessible picture and these separated elements are contrasted with known elements with identify fake and section of money.

### Layout coordinating:

Layout coordinating method is utilized to recognize category of money. Layout coordinating calculation will move a format on accessible picture and if format matches with money then it will return an incentive as genuine else it esteem will be false. By this section of cash can be effectively recognized.

### Examination with limit values:

When every one of the outcomes acquired from previously mentioned calculations now these got results will be contrasted and edge values. Limit is system where range is set and results will be contrasted and these qualities if acquired outcomes lie in the range then genuine esteem is returned else false.

## EXPERIMENTALS RESULTS

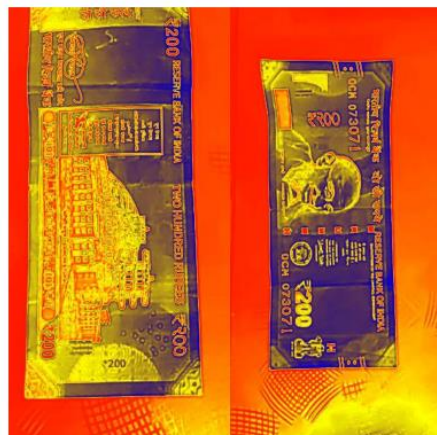
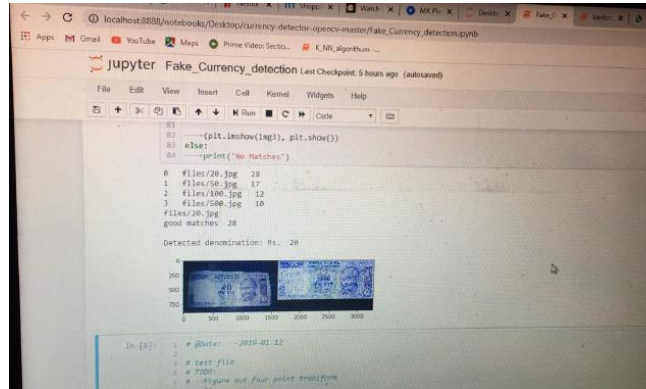


Fig4. Capture image



**Fig5. Processing on Image**

## CONCLUSION:

- This project enables a visually impaired person be aware in validating the currency note to detect whether the currency is original or fake.
- My Python technique when deployed in Raspberry Pi with a scanner or a camera so that it will capture the currency note and perform the image processing techniques imposed in the project by differentiating whether the currency is original or fake based on the parameters of HSV values of the currency note which in front gives the power to an impaired person in detecting it.
- This project can further be extended to form a naïve device using Raspberry Pi and Simulink by creating a model and injecting it into the raspberry pi.
- The extended version can also include completeness of the speech synthesis capability from the naïve raspberry pi device that can be acted as a portable device carried out by the visually impaired persons with utmost flexible manner.

## SUMMARY

With the help of above proposed method, it is possible to develop a system which will easily detect the denomination of Indian currency and also it checks the originality of Indian currency with the help of basic image processing algorithm. The proposed system can be implemented for real time applications such as automating vending machines, automatic ticket counters. This can be achieved with the help of PYTHON Simulink and low cost processor like Raspberry pi.

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