



Counterfeit Currency Detection

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ABSTRACT

Nowadays problem of fake currency increases because of increasing in technology like scanning, color printing so result in counterfeit currency. In India increase in fake paper currency notes of 100, 500, 2000 rupees etc. So detection of fake currency is necessary. The determination of fake currency with the help of image processing. Firstly Image acquisition is done then pre-processing stage applied to that image for suppress unwanted feature and added some feature which are necessary for further process. Conversion of RGB picture into HSV scale. Then image segmentation applied to that image in this image divided into number of objects. Then morphological operation is perform on that picture. Further feature extraction/area of calculation stage applied to that picture and finally that picture compared with the original image.

Keywords: Fake currency, image processing, feature invariant, counterfeit, HSV

I. INTRODUCTION

Many times RBI faces problem of counterfeit currency that major consequences on Indian economy so also increases additional problem. So adding such a technology or machine which will make human efforts more simpler and efficient. For the detection of counterfeit currency bank employee always keep note on that device and tries to find all the feature of

currency and finally identification of fake currency so workload of bank employee increase. So result could more accurate using this system. This system also very useful in shopping malls and investment firms. Automatic counterfeit currency discovery is vital in numerous application as automatic seller goods machine and automatic teller goods machine. This system is useful for detection of fake Indian currency. Eight stages associated with discovery of fake note, for example picture obtaining, data scale transformation, edge identification, highlight extraction, picture division examination of info and yield. This system useful in bank as well small shops that face more problems of counterfeit currency.

Commonly used methods to detect fake notes:

For 2000 note:

Front side features:

- can see numeral 2000 when note held against the light
- At the point when note will be worked then the dormant picture of 2000 will happen.
- 2000 and 'RBI' having the color shift security thread
- Number board with numbers develop.ing from little to huge on the upper left to base right sides
- Ashoka pillar emblem



Fig.1 Security features of 500 & 2000 note

Backside feature:

- We can see Swachh Bharat logo on back side of the note

For 500 note:

Front side features:

- We can see numeral 500 when note held against the light
- When note will be tilted then the latent picture of 500 will be happen
- The orientation of Mahatma Gandhi portrait changed
- Number panel with number changes from little to huge on the upper left to right side.

Backside feature:

- We can see Swachh Bharat logo on back side of 500 note
- Red Fort and Indian flag image
- Rs 500 note having circle in Devnagari on the right side

II. LITERATURE SURVEY

As we know the Printing house being able to make fake paper currency but it is workable for any individual to print fake cash simply utilized for computer and laser printer at home. Fake currency detection methods are explain is as below

Trupti Pathrabe and swapnili karmore [3] introduced a new technique for the classification of Japanese and U.S paper currency that will improve the identification ability and transaction speed. Trupti Pathrabe and Swapnili analyze two sorts of informational indexes which include the time series data and Fourier power spectra. The neural framework is used as input for two cases. For recognition ability they used new evolution method In this system

Embedded system is used for the detection of fake note. This system emphasis on Indian currency features. So no chance of making counterfeit note by people.

The recognition system divided into three parts firstly include the MATLAB is used for reduce image size and extract feature of scanned picture that will used for advance process. HSV shading space completed the work of color feature extraction. Second stage acknowledgement is neural network classifier and lastly fake currency detection will be visible on AVR microcontroller ATMmega32. The AVR microcontroller that determines the validity of given note by glowing the LED light for counterfeit Indian currency. Pictorial information changes by human interpretation with image processing. With the help of the image processing tools collection functions that increase the capacity of MATLAB. That mainly emphasis on HSV color space.

RGB shading space and HSV shading space are not same in light of the fact that the RGB shading space isolates the power of that photo from the shading data Future work include determination of foreign currency with the same system.

Algorithm used by Komal Vora[1] based on frequency domain feature extraction. This method efficiently used the local spatial feature in a currency picture to identify it. Human cannot recognize currency of different countries easily .In this method textural feature are extracted from the Discrete wavelet transform. Non-textural feature are utilize for checking authenticity. They are such a serial number, shading and the textural feature used to group them. Pattern matching gives the required output. Because of that denomination validation will be finished. so that authentication process check the feature of currency like security thread, RBI microprint and then identify currency is fake or real. Future work will be conversion of currency denomination.

Pathrabe and Bawane [5] use a low computational complexity algorithm that uses this author to meet high-speed practical requirements application. It needs to be proposed system has to distinguish between fake and genuine currency. And this is cannot identify counterfeit and genuine currency. Infrared or ultraviolet spectra is used by this technique for determination of counterfeit and original currency.

In last decade problem of counterfeit currency increases this is only because of scanning, color printing. Few years ago only printing house able to

make fake paper currency but nowadays any person can make currency simply by using computer and laser printer. Proposed system given by the Rajesh Shetty and Sai Prasanthi. This system having advantage of simplicity and high speed. Here image is taken by the camera by applying backlighting to that paper currency so that hidden feature see on the picture. Picture then further processed by applying image processing techniques. In this process characteristic extraction plays very important role because it have to extract visible and invisible feature of paper currency. Good characteristic extraction should maintain and enhance the some feature of input picture which help to distinct pattern classes separate from each other. Future scope the system will extract feature even the testing image having the different size [6].

Extract feature from the banknote denomination technique used by Mirza and Nanda [4]. The region will be extracted from the image will be used for recognition of pattern and matching technique of neural network. In which firstly image acquired by the simple scanner on fix dpi with the particular size in which pixel level has been set for obtaining an image. For denomination value of note few filters are applied. They used different pixel level in different denomination note. For finding the denomination value the pattern recognition and neural matching technique used. The three characteristics of Indian paper money, such as security thread, identification mark and watermark, are selected for the counterfeit currency.

Then characteristic of the image of paper currency that will compare with genuine currency. For characteristics extraction, Sobel operator is use. This system has the main advantage is simplicity and high speed. In future they will work on hardware part which will used for picture acquisition for minimizing the counterfeit currency.

Proposed system

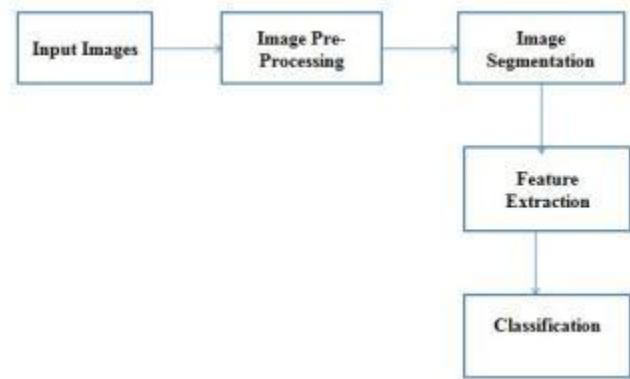
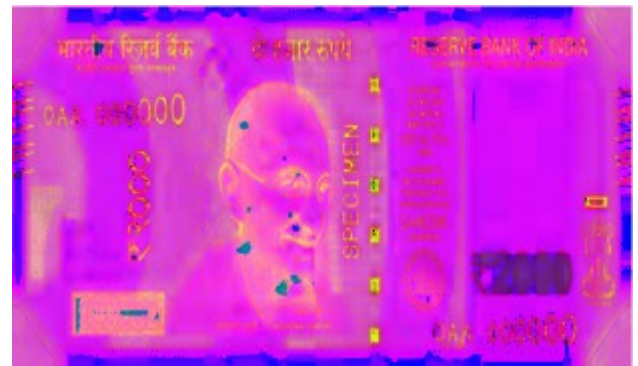


Fig.2 Block diagram of counterfeit currency detection

- 1) *Input Image*: Here image will be taken by the camera. The acquired picture consists of all the features.
- 2) *Image Pre-processing*: The point of picture processing is remove undesirable/undesired distortion and enhance some photo feature that are valuable for additionally process .In that it Include Picture adjusting and picture smoothing.
- 3) *Color space conversion*: The image obtained from the camera is in a RGB scale so need to convert that RGB scale into HSV image because that scale image contain all the intensity information that is necessary for further process.
- 4) *Image segmentation /thresholding*: Picture thresholding is a basic, yet successful, method for dividing a picture into a forefront and background.This pictureexamination procedure is a kind of picture segmentation that isolates objects by changing over HSV images into binary pictures. Image thresholding is most impressive in picture with high levels of contrast.
- 5) *Morphological operation*: Morphology is a wide arrangement of picture processing operations that procedure pictures based on shapes. Morphological tasks apply a structuring component to data picture, making an output photo of the similar size. In a morphological movement, the value of every pixel in the output picture is relies upon a correlation of the corresponding pixel in the information picture with its neighbors. By picking the size and state of the neighborhood, you can develop a morphological task that is touchy to specific state in the information picture. The most basic morphological task are enlargement and disintegration. Enlargement adds pixels to the

limits of items in a picture, while disintegration evacuates pixels on question limits. The quantity of pixels included or expelled from the things in a photo relies upon the size and condition of the organizing component used to process the photo. In the morphological widening and disintegration activities, the condition of any given pixel in the yield picture is dictated by applying an administrator to the comparing pixel and its neighbors in the information picture. The run used to process the pixels characterizes the task as an enlargement or a disintegration.

- 6) *Feature extraction*: Feature extraction a kind dimensionality decrease the efficiently represents interesting parts of picture as a reduce feature vector. This approach is valuable when picture sizes are enormous and a diminished element portrayal is important to rapidly total work, for example, picture coordinating and recovery. Feature recognition, feature extraction, and matching are many times combined to take care of normal PC vision issue for example, object detection, recognition, content-based image retrieval, face detection and recognition, and texture classification. The size of picture will be easily reduced by feature extraction. Input given to the algorithm is too large for further process it is having much data but not more information. Then input data will be converted into reduced representation set of features
- 7) *Comparison*: In this stage, the extracted feature of input image and extracted feature of original image is compared.



(b)



(c)



(d)

Fig. 1. The results of proposed system on real currency (a) Input Image (b)HSV conversion (c) Segmentation results (d) Morphological operation

III. RESULTS

The results of the proposed method are described below:



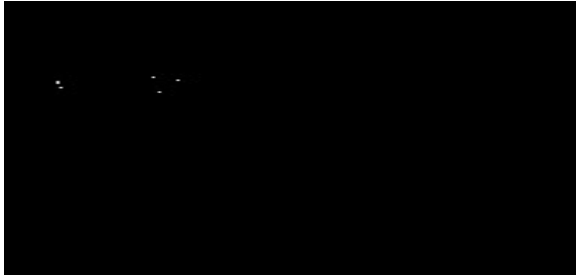
(a)



(a)



(b)



(c)



(d)

Fig.4. The results of proposed system on Fake currency (a) Input Image (b) HSV conversion (c) Segmentation results (d) Morphological operation

From the results of the proposed system it is observed that, the features are appeared in the real currency while the selected features are vanish in fake currency. In this approach finally the number of white pixels in binary image is calculated and make a decision

V. CONCLUSION

Detecting of fake currency is necessary for common man today. So, In this project, detection of fake currency will be done by image processing principle. This is low cost system. The system will work for note denomination of 500, 2000 100, 200 currency etc. The system also provide accurate and valid results. The process of detection of fake note will be quick and easy. In this input will be taken by CCD camera output will be displayed on PC

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