

## **A RESEARCH - DEVELOP AN EFFICIENT ALGORITHM TO RECOGNIZE, SEPARATE AND COUNT INDIAN COIN FROM IMAGE USING MATLAB**

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**Abstract** - Coins are important part of our life. We use coins in a places like stores, banks, buses, trains etc. So it becomes a basic need that coins can be sorted, counted automatically. For this, there is necessary that the coins can be recognized automatically. Automated Coin Recognition System for the Indian Coins of Rs. 1, 2, 5 and 10 with the rotation invariance. We have taken images from the both sides of coin. So this system is capable to recognizing coins from both sides. Features are taken from the images using techniques as a Hough Transformation, Pattern Averaging etc.

**Keywords:** Image Processing, Pattern Averaging, Character Recognition Hough Transform for circle detection, Automated Coin Recognition.

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### **I. INTRODUCTION**

Image Processing Based Coin Recognition System Classification:

- 1) Mechanical method based systems,
- 2) Electromagnetic method based systems and
- 3) Image processing based systems.

1.1 The mechanical method based systems use parameters like radius/diameter, thickness, weight and magnetism of the coin for differentiate between the given coins. But these parameters can not be used for differentiate between the different materials of the coins. It means if we provide two coins one original and other fake which have the same radius/diameter, thickness, weight and magnetism but with different materials of mechanical method based coin recognition system then it will treat both the given coins as original coin so these systems can be fooled easily by hackers.

1.2 Now, for the electromagnetic method based systems can differentiate between different materials because in these systems the coins are passed through an oscillating coil at a certain frequency range and different materials bring different changes in the amplitude and frequency. So these changes and the other parameters like radius/diameter, thickness, weight and magnetism can be used to differentiate between the coins. The electromagnetic method based system of coin recognition systems improve the accuracy of Recognition but still they can be fooled by some of game coins.

1.3 In the recent of years coin recognition systems based on images have also come into the picture.

### **II. LITERATURE SURVEY**

Yamini Yadav ,Apoorvi Sood In his paper the aim for coin recognition system is to classify high volumes of coins with high accuracy within a short time gap. This paper presents the comparison between various types of coin recognition systems in terms of their accuracy which has been proposed by various researchers based on image processing, image recognition method. The accuracy rate

delivered by R.Bremananth et al was 92.43%, Adnan Khashman system et al was 96.3%, Hussein R.Al-Zoubi system et al was 97%, Shatrughan Modi et al was 97.74%, Deepika Mehta was 40% to 50%. Sandeep Kaur *et al*, International Journal of Computer Science and Mobile Computing, Vol.no.3 Issue.9 of September- 2014, pg. no.259-262 © 2014, IJCSMC All Rights Reserved 261 Suchika Malik, Parveen Bajaj, Mukhwinder kaur are this paper presents reliable coin recognition system based on polar Fast Fourier Transform system. There are basic need to automate the counting and sorting of the coins. For this machines need to recognize the coins very fast and accurately as for further processing depends on this recognition. However the currently available algorithm to focus basically on recognition of the modern coins. In this paper they have developed ANN (Artificial Neural Network) based on automated coin recognition system for the recognition of modern coins. Then, this extracted features are going to passed as input to the trained neural network of 98.798% recognition rate has been achieved during the experiments. Sonali A Mahajan, Chitra M.Gaikwad in his this paper is to detect denominations of Indian coins. Counting all coins manually, collected in large amount such as the coins collected at Indian temples is very difficult. The method proposed in this used reduction of technique that is the input image is reduced by database image repeatedly by the rotating it with a fixed angle at every time. Denomination of the coin is verified by comparing the coin from both sides. Thus, this method proposed here is rotation invariance and also by using two way scanning and comparison of the coin, method determine the denomination clearly even if the database is having different coins with the same radius. Chandan singh, Amandeep kaur in his paper described polar harmonic transforms are orthogonal rotation invariant transforms which provide many numerically stable features. The kernel functions of the PHTs are consist of the sinusoidal functions that are inherently of computation intensive. They develop a fast approaches for their computation using recursion and also 8-way symmetry /antisymmetry property of the kernel functions.

### III. PROPOSED COIN RECOGNITION SYSTEM

The following steps are taken in the proposed coin recognition system:

**Step 1:** Develop RGB code for loading database of coin image in MATLAB.

**Step 2:** Convert this RGB image to grayscale Image using MATLAB.

**Step 3:** Applied Image Thresholding on Gray Image in MATLAB.

**Step 4:** Find centroid, area and diameter of coin image using regionprops command in MATLAB.

**Step 5:** Crop the coin image automatically in MATLAB.

**Step 6:** Detection of the Edge of Image in MATLAB.

**Step 7:** Recognize the coin using character recognition.

#### 3.1 Acquire RGB Coin Image

This is the first step of coin recognition system process. In this step the RGB coin image is captured/acquired. Indian coins of denominations Rs.1, 2, 5 and 10 were scanned from the both sides at 300 dpi (dots per inch) using the color scanner as shown in below Fig. Five coins of each and every denomination were scanned.



### 3.2 Convert RGB Coin Image to Grayscale

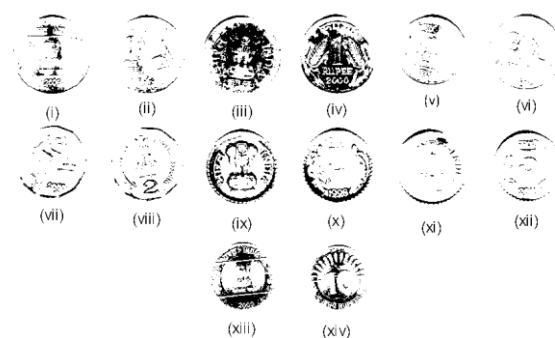
From the first step the image we got the 24-bit RGB coin image. Image processing of colored images can take more time than the grayscale images. So, for reduction the time required for processing of images in further steps it is good to convert the 24-bit RGB image into the 8-bit Grayscale image. Below fig. shows the grayscale converted image in given RGB image of the coin.



### 3.3 Applied Image Thresholding on Gray Image in MATLAB

From the second step, we get gray scale image of the coin. Now, I am going to use Image Thresholding in MATLAB.

By this Step, I got Threshold image of the gray image. This is shown below.



### **3.4 Find the centroid, area and diameter of coin image using regionprops command in MATLAB.**

We got threshold image from the third step. Now, we use regionprops command for finding centroid, area and diameter of given image using MATLAB. I got all properties of image by this. Which is shown below.

```
ans =  
Area: 1  
Centroid: [351 91]  
BoundingBox: [350.5000 90.5000 1 1]  
SubarrayIdx: {[91] [351]}  
MajorAxisLength: 1.1547  
MinorAxisLength: 1.1547  
Eccentricity: 0  
Orientation: 0  
ConvexHull: [5x2 double]  
ConvexImage: 1  
ConvexArea: 1  
Image: 1  
FilledImage: 1  
FilledArea: 1  
EulerNumber: 1  
Extrema: [8x2 double]  
EquivDiameter: 1.1284  
Solidity: 1  
Extent: 1  
PixelIdxList: 181041  
PixelList: [351 91]  
Perimeter: 0
```

### **3.5 Crop the coin image automatically in MATLAB**

From the above step four, we get area, diameter and centroid of coin in MATLAB. By this step 5, we have cropped image of each and every coin of multiple coin in one image, means every coin from the image are separated. By this step, image will crop automatically. And we got cropped image.

### **3.6 Detection of the Edge of Image in MATLAB.**

After crop the image, the next step is edge detection. Canny edge detection is most important technique for this. By the we got sharp edge of image. In this step, we have edge of numbers on coin.

### **3.7 Recognize the coin using character recognition.**

After getting edge of coin image, we applied character recognition technique. By this we have detect character on image. So we have numbers which can identify the coin.

## **IV. CONCLUSIONS**

In This paper, presents various systems developed and existing techniques of coin recognition based on image processing method. In this paper we basically provide of various methods of recognition of the coins and get the best accuracy. It was shown that the described project contributes to the image based coin recognition and classifications. We presented an overview of the work-packages and project

partners. Thereby, coins from more than 31 countries can be recognised and separated from it. Further research will be carried out to improve the recognition result and also speed. And important thing is that, the Recognition time is very less.

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