

# ROTATION OF MOTOR THROUGH COIN DETECTION

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**Abstract:** Coin Detection is used for differentiating coins on the basis of different coin denominations by applying multiple algorithms. As the coins we use earlier have different feature from that which are being used now. So these features help in classifying different coins. Coins in India are classified on the basis of different parameters like some of the parameters on which we can differentiate coins from each other are such as shape, size, surface design, and weight and so on. Therefore, it is easy for the automated machine to classify Indian coins. Different coin recognition approaches have been used but the most successful method for coin detection is Image recognition. In this paper we proposed an algorithm which demonstrate the coin detection technique in which we assign some values to different coins and then match them with the values stored in the blob, if the value matched we rotate the motor else check again for new values.

**Keywords:** Coin Detection, Coordinates, Matlab, Image Processing, Histograms.

## I. INTRODUCTION

A coin is a hard metal, usually in the form of disc which is issued by government to be used in the form of money. Indian coins have different values including one rupee, two rupee, five rupee and ten rupee. They are used as spare change, in telephone booth exchange etc. In earlier times, the automated machines which made use of coins could be easily deceived as; duplicity of coins was very popular. Disc shape metal with same diameter but different material was used which these machines accepted them as real coins, so it was easy for people to fake these machines. To overcome this, image reorganization method was used. We use different techniques which includes gray scale, edge detection etc. It is important how to extract the characteristic information from currency image and select proper pattern recognition algorithm to improve the accuracy of currency recognition.[6] Image matching is always a big problem and it more complex when we are about pattern matching because same image acquired by the device different at different time, each time different set of coordinates and different size of images acquire by the device which may cause a great problem while in pattern matching.[7], for example see in figure [1].

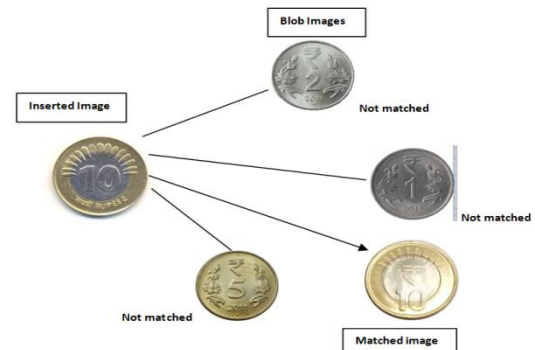


Fig 1: Pattern Matching

The images are disturbed with, the transmission of limited range of light, disturbance of lightening, low contrast and blurring of image, color diminishing during capturing. The large disturbances change the image quality and they show large temporal and spatial variations. Therefore, image must be pre-processed before operations like segmentation or feature detection, which are the important processes in image processing.[8] Image Recognition is the process of detecting an object in a video or image. This concept is used in many applications like atm machines, telephone booths, banks, and other organizations for security purpose. Typical image recognition algorithm include: Optical character recognition. To implement these techniques we use Histograms, Data flow diagrams, Decision tree. The Polar coordinate image of coin on circles with different radii is used as the feature. For coin recognition. In the recent years coin recognition systems based on images have also come into picture. In these systems first of all the images of the coin to be recognized is taken either by camera or by some scanning. Then these images are processed by using various techniques of image processing like FFT, DCT, edge detection etc.[4] In spite of our daily uses coin recognition systems can also be used for the research purpose by the institution or organizations that deal with the ancient coins. [5] Image detection can be affected by factors like noise, blurred image, and rotational factors. The coin classification technique is successful based on the following assumptions and computations.

1. The coins are moved on a conveyor belt.
2. Proper lighting is focused on the coin.
3. Each coin is separated and fed to the system for recognition.
4. Coins are weighed accurately.
5. The coin images are collected both sides of the coin.
6. It is possible to capture the side view of the coin image.
7. The coin image can be rotated by any degree.
8. The Circular, Hexagon, Octagon, Polygon shape of coin's radius are measured

9. The coin Circumference/Perimeter and area are computed.
10. The thickness of each coin is given to the system.
11. The coin images with 256 gray values are collected.
12. The coin average gray values are computed. [2]
13. Different methods have been proposed by researchers for coin recognition. In this paper we are discussing various approaches and systems that are available for coin recognition like

### 1. Coin Image Magnification is Zooming and de-zooming

Are processes by which a coin image is increased or decreased in size, the special technique is introduced to recognize 100% of the coin image. The zooming helps us to make bigger size of a coin image, by which recognition rate is increased. The Coin Recognition of Pre-

Processing of various stages like cropping, scaling, resizing, rotation are done in the Matlab code. [2]

### 2. Coin Centroid, Circumference and Area Computation

The area of a coin image is calculated by total number of pixels representing the coin image. The perimeter is the number of pixels along the outer contour of the coin. Using radius or side of coin image, we can compute circumference or perimeter of the coin depending upon its shape namely circle, square, hexagon, octagon, polygon using suitable formula.[2]

### 3.Heuristic approach

To classify the coin it is proposed to use heuristic approach based on various parameters such as shape, weight, area, average gray value, thickness and diameter etc. [2]

### 4. Segmentation

Image segmentation is a process of portioning the digital image into multiple regions that can be associated with the properties of one or more criterion. Properties like grey scale color, texture and shape help to identify regions and similarity of such properties, is used to build group of regions having a particular meaning. [3]

### 5. Histogram

The histogram of an image tells about the distribution of Gray levels in image massively useful in image processing; especially in image segmentation. [2]

### 6. Thresholding

Thresholding methods define a range of brightness values (the thresholds) in the original image and select the pixels with in this range as belonging to the foreground, whereas the remaining pixels are rejected to the background. [3]The various processes for coin detection are been proposed firstly data is captured and stored which is then followed by segmentation process. Segmentation process is further divided into Coin Segmentation and Cropping. In coin segmentation process image is extracted and then a template of the extracted image is made and threshold value is calculated. While in cropping we perform data compression and edge detection using training and testing of the image. Then finally all the above process are merged together and then concluded. Figure [2] shows various steps for image recognition.

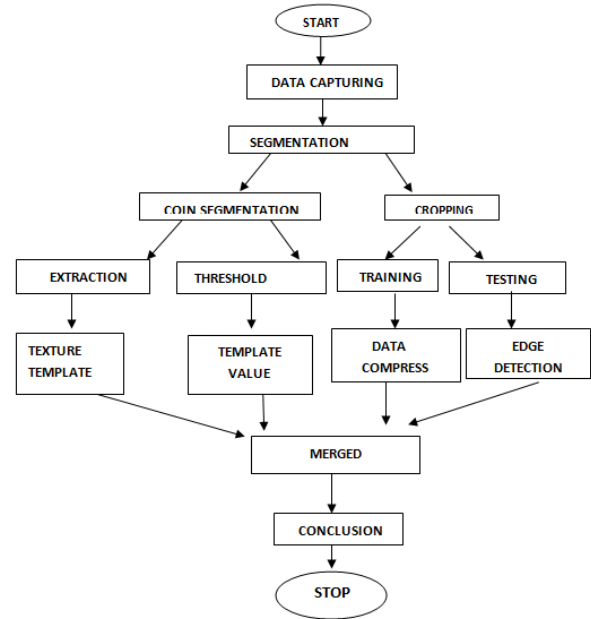


Fig 2: Flowchart for demonstrating image recognition

## II. METHODOLOGY OF COIN RECOGNITION

Coin recognition is done by variety of methods and techniques. The steps required to detect and recognize the coin is described by using the following flow chart. These steps can vary according to the technique used. Different types of coins used now days are 1 rupee, 2 rupee, 5 rupee, 10 rupee. All coins have different features which differentiate them from each other like in

1 rupee: One the front side of the coin there is an Indian Emblem below which Satayamev Jaytae is written. On sides India is written in English as well as in Hindi. While on the back side, two lotus flowers are present and single digit number '1' written.

2 rupee: One the front side of the coin there is an Indian Emblem below which Satayamev Jaytae is written. On sides India is written in English as well as in Hindi. While on the back side, two lotus flowers are present and single digit number '2' is written.

5 rupee: One the front side of the coin there is an Indian Emblem below which Satayamev Jaytae is written. On sides India is written in English as well as in Hindi. While on the back side, two lotus flowers are present and single digit number '5' is written. It is of gold color.

10 rupee: On the front side of the coin there are two lines between which there is an Indian Emblem below which Satayamev Jaytae. Above the top line India is written in English and Hindi. While on the back side there are 15 leaves and two digits number '1' & '0' is written. It is of twin color i.e. silver color in centre and gold color on the edges. While extracting the pattern firstly, we find the size of the circle and then store and calculate the scale of the image. After this we take the coin image and then read it. Since different coins are of different sizes so we need to find radius of each coin. Then we extract the

circle from image and find its radius through which we find its circumference and then put it on the blob. Further, we resize the image to the size of the pattern calculated before using a function `imresize` (.). Then we find the image of the coin at each angle from 0-360 degrees through a function `imrotate` (.). We then match the image at each angle with the pattern stored in the blob using function `normxcorr2` (pattern, coin). After matching, it extracts the patten and matches the pattern with stored image at each angle and then finally shows the output with the matched image. With a flowchart shown in figure [3] above method is been demonstrated, where first we scan a coin and extract its features. Then note the size of image and start matching it with each image stored in blob. Suppose there are 100 different images of one rupee, two rupee, five rupee and ten rupee coins taken at different angles. We take the input of the image input and start matching the image that suits the best. The input image will be matched with every image one by one until it finds the replica of the input image. It will select few images that resemble the input image. Then from the set of selected images it will find the input image. Then if the input image matches, the result will be displayed that the image is matched. Otherwise it will display the result as image not found.

done. If value is matched, then the motor will rotate. Otherwise the process will start again. Figure [4] is the representation of our proposed system.

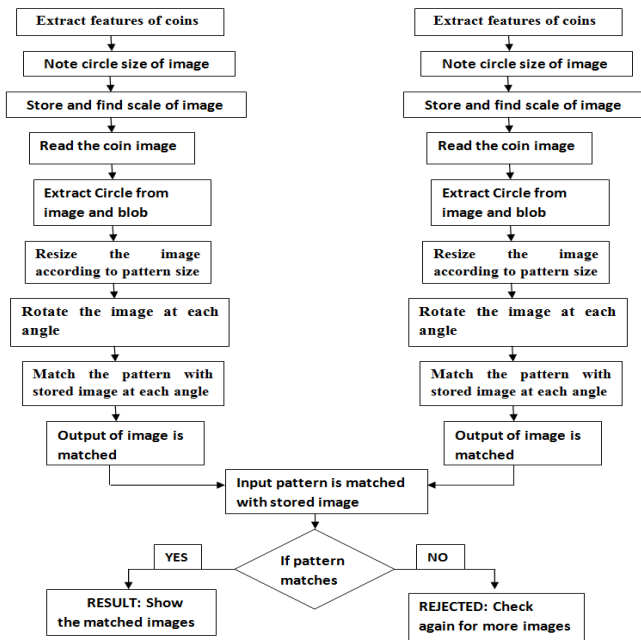


Fig 3: Flowchart for extracting the image.

III. PROPOSED SYSTEM

The coin detection can be used for rotation of motor. Suppose one rupee represents left, five rupee coin represents centre and ten rupee coin represents right. Then the coins are passed through a machine. On the other side, the image of coins is kept there, when the coins are passed, the value of coins is detected. The coins passed will start matching on the other side i.e. left matches with left; enter matches with centre and right matches with right image. Value is passed through port and matching is

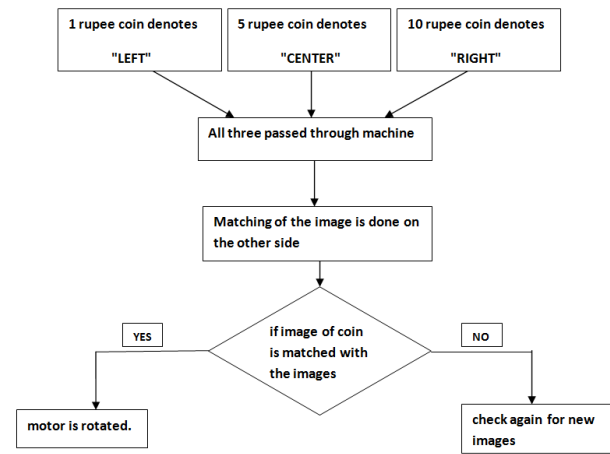


Fig 4: Proposed System

IV. ALGORITHM FOR PROPOSED SYSTEM

1. Start;
2. Initialize image variables rs1, rs5, rs10 with input images;
3. Detect Coin Variable and if (rs1==coin1) and (rs5==coin5) and (rs10==coin10) then;
4. Left=rs1, right=rs5, centre=rs10;
5. TransferFromPort ptp and match ptp value left=left and right=right and centre=centre;
6. If ((ptp==left) and (ptp==right) and (ptp ==centre) then;
7. Motor m will be rotated;
8. Stop;

Figure [5] represents above algorithm.

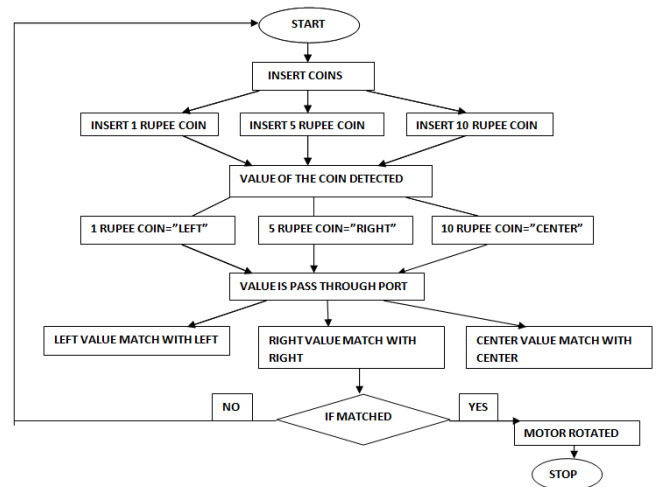


Fig 5: Representation of Algorithm

## V. CONCLUSION

Coin Detection using image processing is an efficient way for coin recognition. In this paper we have proposed a system in which motor will be rotated on the basis of different values of coins. This method provides the high data accuracy and is easy to implement. This system can be implemented and used as a real life example to help people in their daily life.

## FUTURE SCOPE

Future scope includes the actual implementation to rotate motor through coin detection. The proposed system can be used to implement image intelligence. This machine will help in fast access of coins. Lighting condition will not affect in coin detection even not the position. Since different values are assigned to different coins which will help for this motor rotation.

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