Coin Recognition Using Image Subtraction

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Abstract- **In this paper we propose a system based on coin recognition in which Indian coins of different denominations are detected by image subtraction technique. The goal of the system is achieved in three phases (Acquisition, segmentation, subtraction). Firstly, high resolution image is taken as input and the coin image is separated from its background using segmentation, then comparison between input image and standard database image is performed. Technique of rotation invariance is applied in this system in which the input image of coin is rotated by certain fixed angle and then compared with the database images after every rotation. This technique facilitates transaction making it easier in all forms of trade. This is the convenient method of coin recognition.**

Keywords- Image acquisition, image segmentation, image subtraction*.*

I. INTRODUCTION

Use of coins seems to be increased nowadays. Coins are made up of non corrosive metal hence their lifetime is more than that of notes. Thus, the need for efficient coin recognition system is increasing day by day.

Contribution of computerized coin recognition system in Banks, Temples, vending machines, supermarkets and likewise in all automated systems proves to be significant and efficient as most of the coins are used in these areas. The aim of this paper is to achieve a convenient method of coin recognition using rotational invariance method.

In earlier approaches coin was recognized by its physical properties like size, weight, material etc. This approach proves very inconvenient if fake coin with same dimensions like weight and size is used in automated systems like weighing machine, slot machine, coin box etc. so this technique proves to be inefficient. This drawback is overcame in image subtraction technique.

Unlike above approaches this paper uses the technique of rotation invariance where coins are recognized using subtraction method . In this method input image referred as test image is compared with the database image referred as object image and the sum of pixel values of output image are compared with the minima value.

Fig. Front and rear sides of a coin

II. ASSUMPTIONS

Following parameters are kept constant during image acquisition:

- Lighting condition
- Distance and Position
- Perpendicular image acquisition

Take care that the surface of the coin is clean.

III. SYSTEM ARCHITECTURE

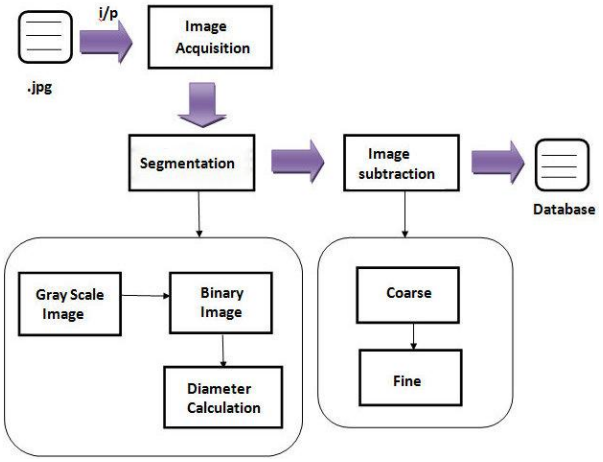

Fig. System Architecture

The above block diagram shows the basic processes that are necessary for the implementation of coin recognition system. Stepwise processing is as follows:

1. Image acquisition: Image is acquired using high scale resolution camera. This image will be test image.

2. Image segmentation: Coin image is separated from the background using segmentation process.

a) Gray scale image: Test image is converted into gray scale image using :

gray = (0.299*r + 0.587*g + 0.114*b)

b) Binary image: Test image is converted into binary image by assigning 1 to pixel values above threshold and 0 to pixel values below threshold.

c) Diameter calculation **:** Traversing row wise we get two positions which depicts the two ends of diameter. We get the centre in terms of horizontal axes.

3. Image subtraction: The image subtraction technique takes two images as input and gives a third image as output, whose pixel values are simply the pixel values of the first image minus the corresponding pixel values of the second image

a) Coarse image subtraction: Test image is rotated by certain fixed angle. After every rotation test image is compared with standard object image. Each image is a 2d array of pixel values. Output image is obtained by carrying out subtraction between two 2d arrays of pixel values.

b) Fine image subtraction: Test image is rotated by smaller angle than that of in coarse image subtraction. After every rotation test image is compared with standard object image. Each image is a 2d array of pixel values. Output image is obtained by carrying out subtraction between two 2d arrays of pixel values.

IV. ADVANTAGES

1. Reduced cost:

The proposed system allows recognition of coin with minimum hardaware cost. As the only hardware involved in this project is a camera, the required cost automatically gets reduced.

2. Accuracy:

The system allows recognition of coins accurately as compared to the existing system based on pattern matching algorithm.

3. Reduced Human Efforts:

Automation of operations reduces human efforts required for recognition of coins.

CONCLUSION

Coin recognition using subtraction method requires less processing time as it contains image segmentation as a first step. This system recognizes image very fastly with good accuracy as it is done by subtraction method. This solves a real life problem where physical similarities between these coins led to abusing slot machine.

Future works will include modifications of the technique and also merging of other image processing techniques, such as, Neural Networks training using Edge detection which would extricate the process from the dependency over standard light intensity and standard distance between coin and camera during image acquisition adding on to the accuracy of the process.

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