

Study of Indian coin identification by using Blob detection technique

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Abstract— Digital image processing is a fast growing field and many applications are developed in science and engineering. Image processing has the possibility of establish the latest machine that could perform the visual functions of all living beings. Object recognition is one of the most imperative features of image processing.

Coin detection is the most interesting and challenging research topic from past few years. It is known that the size of a coin is changing day by day. 1 rupee coin is small in size and also in big size that's create a problem in coin detection. So we need a approach which is able to detect a particular coin. In this paper we will discuss on coin detection technique.

An automated system is developed using morphological recognition algorithm in MATLAB R2013a. In which image is captured from camera and converted into gray scale image for pre-processing. After conversion, image complemented, binary conversion is applied on image. After conversion canny edge detection method has done and passed this detection to the dilation process. After filtration and dilation, area is selected where number of coins is maximum and coins are recognized from the image in the form of bounding box. Blob analysis is used for each coin separately to detect indian coins.

Keywords- Digital Image, application, object detection, coin detection.

I. INTRODUCTION

Image processing is processes which transform an input image file into digital form and perform some operations on it, in order to get an increase image property or to extract some useful information from it. An image can be easily repaired using various image processing techniques and algorithms. Image processing a type of signal disbursement in which input is image, like video frame or photograph and output may be image or characteristics correlate with that image. Usually image processing system working like two dimensional signals and apply the set signal processing methods to them. Image processing is widely used and rapidly growing technologies today, with its applications in various aspects of a business. Image Processing forms core research area within computer science, telecommunication, information technology and engineering[1].

During the last three to four decades a number of techniques have been introduced and developed in image processing. Most of the techniques are developed for enhancing images achieve from unmanned, space probes, spacecrafts and military reconnaissance flights. Image Processing systems are becoming popular due to easy availability of powerful personnel computers, graphics software, large size memory devices etc [2].

II. EXPERIMENTAL RESULT AND ANALYSIS

Coin detection is a type of the object recognition system. This system is the most interesting and challenging research topic from past few years. We know that the size of coin is increasing day by day in the developing and developed countries. I used simple morphological recognition method for coin detection using image processing technique in Matlab which is best method for detection of 2Rs, 5Rs and 10 Rs coin. We can easily compute the total numbers of coins.



Figure 1: Rs 2 Coin

III. METHODOLOGY

An automated system is developed using morphological recognition algorithm in MATLAB R2013a. In which image is captured from coin and converted into gray scale image for pre-processing. After conversion, image complemented, binary conversion is applied on image. After conversion canny edge detection method has done and passed this detection to the dilation process. After filtration and dilation, area is selected where number of coins is maximum and coins are recognized from the image in the form of bounding box. Blob analysis is used for detecting each coin. Here we are using reference image 1.

This block diagram include following steps:

- 1) **Image Acquisition System:**
 - a) Read Coin image
 - b) Resize Image
- 2) **Preprocessing Operations**
 - a. RGB to Gray Scale conversion
 - b. Image complemented

3) **Image Segmentation Process**

- c. Binary conversion
- d. Edge Detection

4) **Image Enhancement**

- e. Filling Holes on images
- f. Creating Holes Edge Detected Images
- g. Filtration of image using Bewareopen command using High pass filter

5) **Object recognition**

- h. Crop of selected area
- i. Blob Analysis
- j. Coin Detection

IV. PROCESS OF COIN DETECTION

Process to detect coin include many steps. Descriptions of these steps are as following:

1) **Image Acquired**

Image acquisition is the first stage of any vision system. We can obtain the image and after that, various methods of processing can be practiced to the image to perform the many different vision tasks required today [3].



Fig. 2 Coin

However, if the image has not been acquired properly then the expected tasks may not be achievable, even with the aid of some form of image enhancement. Here we will read the coin image in Matlab to detect the coin.

2) **Image Resize**

Here image is resized in desired size to save the memory. Here we used 400x600 image resolution.

3) **RGB to Gray Scale Conversion**

In this paper the algorithm described is not depend on the type of colours in image and confide mainly on the gray level of an image for processing and extracting the required information. Colour components like Red, Green and Blue value are not used throughout this algorithm. So, if the input image is a colored image represented by 3-dimensional array in MATLAB, it is converted to 2-dimensional gray image. [4].



Fig. 3. Gray Scale conversion

Image Complemented

As it is known that in the complement of a binary image, zeros become ones and ones become zeros; so in image complementation black and white are reversed. In the complement of an intensity or RGB image, each pixel value is subtracted from the maximum pixel value supported by the class (or 1.0 for double-precision images) and the difference is used as the pixel value in the output image. In the output image, dark areas become lighter and light areas become darker [5].



Fig. 4. Complement Binary Image

4) **Binary Conversion**

In a binary image, each pixel assumes only one of the two discrete values: 1 or 0. A binary image is stored as a logical array. An image consists of numeric values between 0 - 255. The numerical value of the picture is reduced to two values with binary level. Thus, an 8 - bit image is converted into 2 - bit format. The threshold value must be determined for this conversion. If the pixel value in the image is greater than threshold value, then the pixel value is shown as "0"; and if the image pixel' value is less than threshold value, the pixel value is shown as "1". In this way the image is converted to the binary level [6].

Image is converted into binary image from gray scale. Intensity change value is calculated easily as compared to gray scale and color image.



Fig.5 Binary Image

5) **Canny Edge Detection**

Edge detection, especially step edge detection has been mostly applied in various different computer vision systems, which is an important technique to extract useful structural

information from various vision objects and fiercely reduce the amount of data to be processed. It has found that, the requirements for the application of edge detection on diverse vision systems are relatively the same. Thus, a development of edge detection solution to address these requirements can be implemented in a wide range of situations [7].



Fig. 6 Canny Edge Detection

6) Filling Holes

Here we will fill the holes which were created on the canny edge detection to detect the coins. This is the major step of coin detection. This is the main part of the Morphological operations.

7) Filtration using HighPass Filter

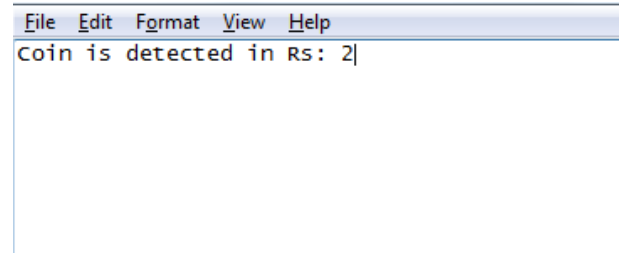
A high pass filter is the basis for most sharpening methods. An image is sharpened when contrast is enhanced between adjoining areas with little variation in brightness or darkness. Here we got those pixels which are greater than the value of 20. Those pixels whose values are lesser than the 20 pixels are suppressed [8].

8) Blob Analysis

Blob Analysis is a common technique of machine vision which is based on analysis of logical image regions. As such it is a tool of choice for applications in which the objects being checked are clearly appreciable from the background. Diverse set of Blob Analysis methods allows creating tailored solutions for a wide range of visual inspection problems [8].

9) Output in Notepad

When the blob analysis has been done the detected output of the coin is shown on the notepad.



V. CONCLUSION

In last couple of decades, the size of coins have been changing day by day. It is becoming difficult to detect of each coin. Thus, it is needed that type of system, which is capable of providing appropriate solutions to the coins size issues and hence this object detection is developed .

In this proposed approach an automated system is developed in MATLAB R2013a. For using the different technique from previous work, this paper used canny edge detection method for detecting the coins using blob analysis. We have successfully detected coin with above given method.

VI. FUTURE SCOPE

This method is best suitable for a properly rounded coin , but for octagon shape of coin this method will not be applicable, therefore this problem can also be overcome in near future in order to get more appropriate consequences.

VII. REFERENCES:

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