

Object Sorting Based On Color Using MATLAB

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Abstract- In the mechanical industries jobs of different sizes and shapes are manufactured, which are further assembled in machinery. A small error of any type in job may affect machines significantly. The aim of this project is to identify manufacturing defects and sort faulty products. An intelligent conveyor system allows manufacturer to sort a faulty product from the bunch of products. They are sorted on the basis of shape and color.

The system here compares the real time images of products with reference shape and color provided by the manufacturer. The faulty product will be then identified, if the shape or color or both the parameters are different than the reference ideal parameters. MATLAB is used as image processing tool. The project can be enhanced for non-industrial applications with software modifications.

Keywords- color, shape, sorting, MATLAB

I. INTRODUCTION

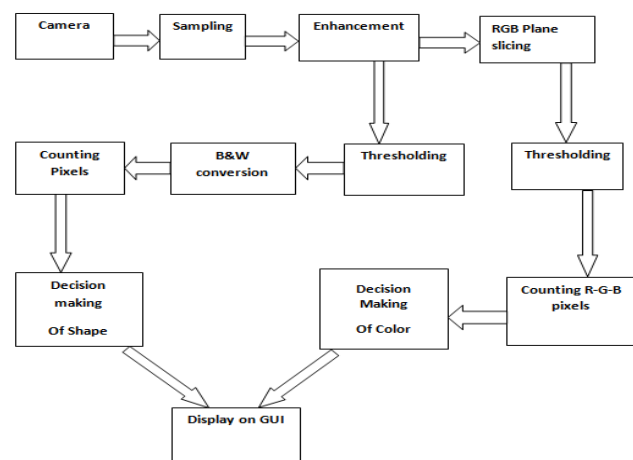
Today we are moving towards a world of automation and intelligent systems. The applications of electronics are not only limited to computers and communications, they are also influencing every field. The repetitive tasks with same accuracy and sensitivity can be completed using automated instruments.

Normally, sorting of the objects is done by manually. It consists of 4 integrated stations called distribution, testing, processing and handling. Old sorting method uses a set of inductive, capacitive and optical sensors do differentiate object color in the testing station. Handling is done by using a programmed manipulator. No vision capability exists in the system to improve its performance and flexibility. In this case, there is a possibility of minor error which will affect the accuracy in sorting. Also for huge systems, time and manpower required will be very high. Automated systems can be used to remove such human errors and also it saves time and money.

Here we are developing a color and shape of object separator which automatically separates different color and shape of objects using image processing.

Intelligence in terms of decision making ability of machines, more accurate specifically, robots. In many situations, autonomous systems do provide effective solutions to menial or dangerous tasks. In many cases, it is desirable to design an automated system that can identify objects and relocate them if the object meets certain prescribed criterion. This paper presents a similar but simplified system which will sort the objects according to different parameters such as color and shape using simple image processing technique. The system is trained initially with a set of images defined as the reference images. Then while execution, real time images are compared with the reference image parameters and respective output is then fed to the placing system through parallel port of the computer

II. SYSTEM DESIGN AND METHODOLOGY



The main aim of this project is to sort the objects on various parameters like color and shape. So the proposed block diagram consists of following blocks—

- A. Image Acquisition
- B. Image Processing
- C. Display for Result

2.1 Image Acquisition

To work with the image one acquires, one must bring it into the MATLAB® workspace first. To bring the image into MATLAB® workspace image acquisition toolbox is used. The image of the object is captured using camera

mounted on the computer. The input image from the camera cannot be given for processing directly. Pre-processing is done on the image such as thresholding. Then only object image I converted in binary format. This final threshold image of object is now ready for processing.

2.2 Image Processing

Here the objects are sorted with help of two parameters color and shape. There are two codes for calculating shape and identifying color object.

In calculating size the sum command is used to find out number of white pixels present in the frame. To identify the color, firstly the R, G, B contents are separated and by using same command the color is identified.

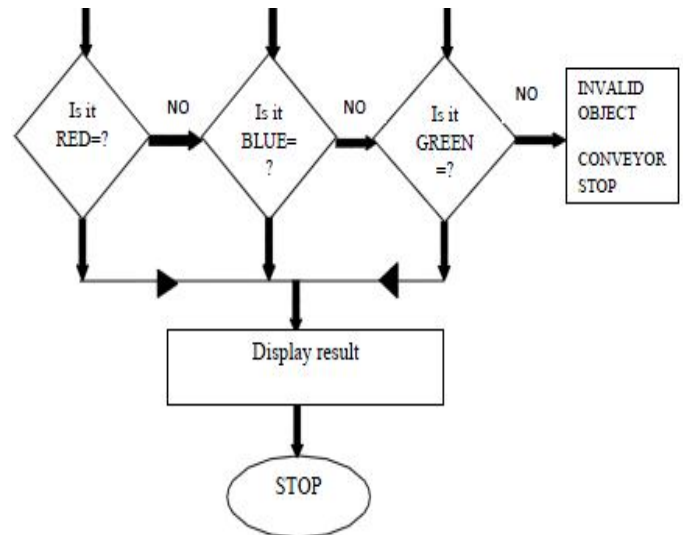
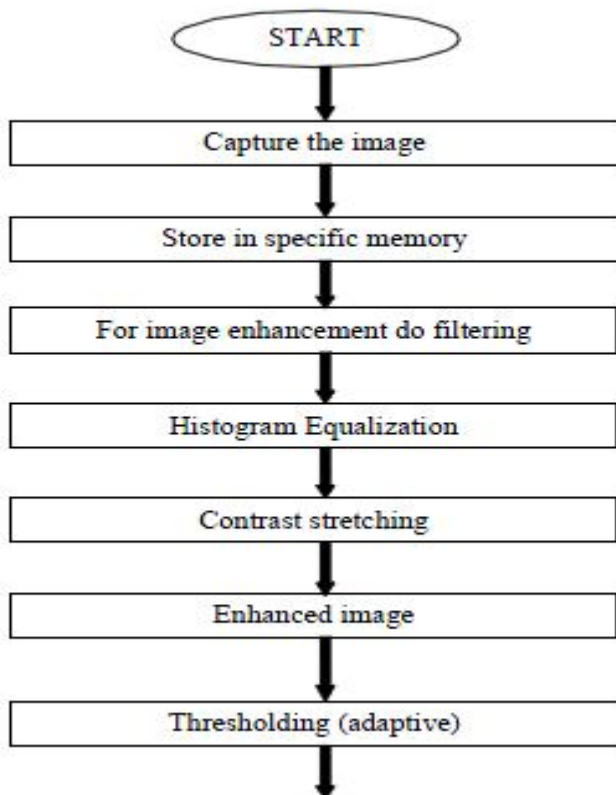
2.3 Displays for Result

Display is used to show the final result.

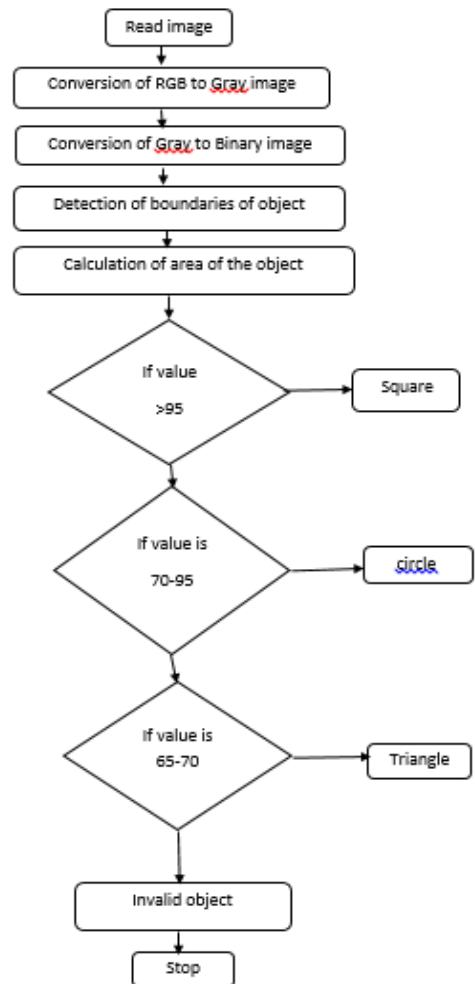
Object is sorted on basis of color and shape.

III. SOFTWARE DESIGN

3.1 Flowchart of color detection



3.2 Flowchart for shape detection



IV. ENTIRE SYSTEM OPERATION

Object sorting is done using two ways: Color wise sorting and Shape wise sorting.

4.1. Color-Wise Sorting

4.1.1. Image Acquisition: First the camera is initialized.

Then the conveyor is started, and the system is in polling mode to check whether the object is in front of camera or not. If the object is in front of camera, then the image is captured through webcam using get snapshot function.

4.1.2. Color Sorting:

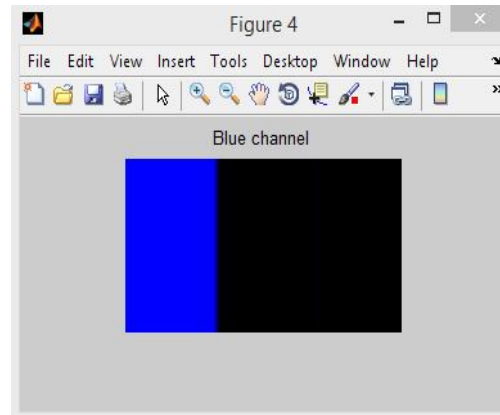
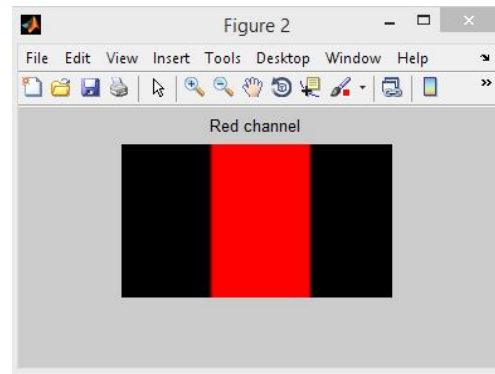
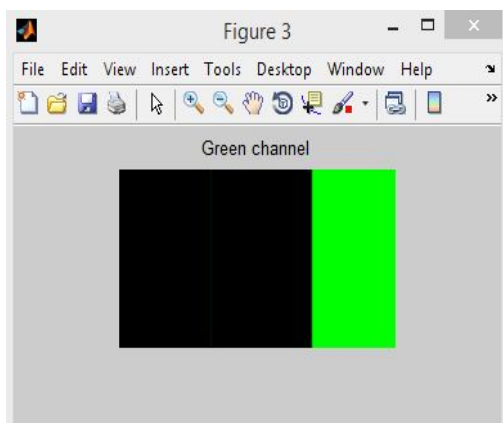
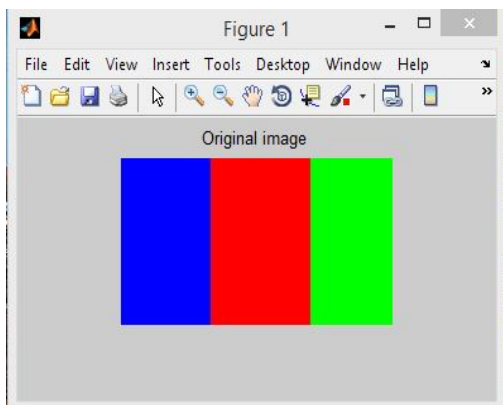
Here the captured image of the object is processed to find out which color of object is? This decision is made by separating the R, G, B content of captured image.

4.1.3. Execution:

If the object is GREEN it will show Green color in Green plane but Black in other two planes.

Similarly if the object is RED it will show RED color in RED plane but Black in other two planes.

Similarly if the object is BLUE it will show BLUE color in BLUE plane but Black in other two planes.



This how we are going to separate R, G, B contents. This will lead us to identify the color of the object.

4.2. Shape-Wise Sorting

4.2.1. Image Acquisition:

Firstly, the camera is initialized & the appropriate thresholding values are set. Then the reference parameters are given for comparison. For all the reference images, the area is calculated and stored in A1, A2, A3 variables. After this the conveyor is started to check the object is in front of camera or not. If the object is in front of camera then the image is captured through webcam and thresholding is done.

4.2.2. Object sorting using area:

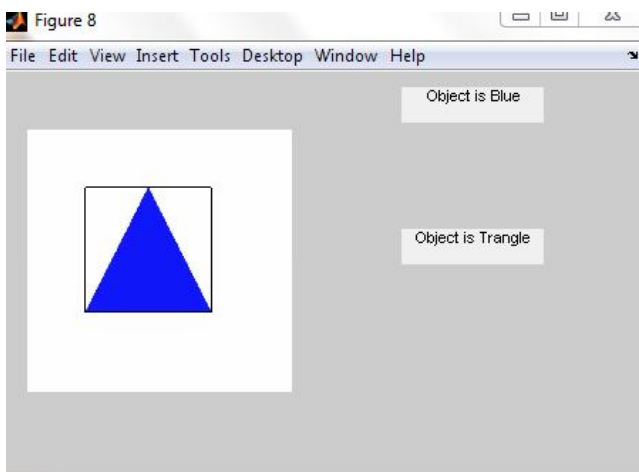
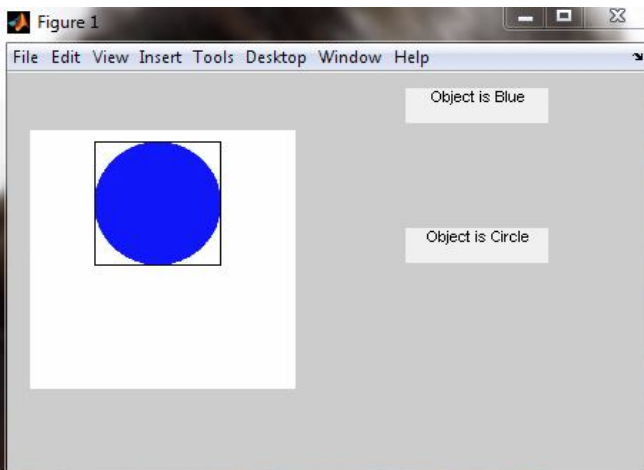
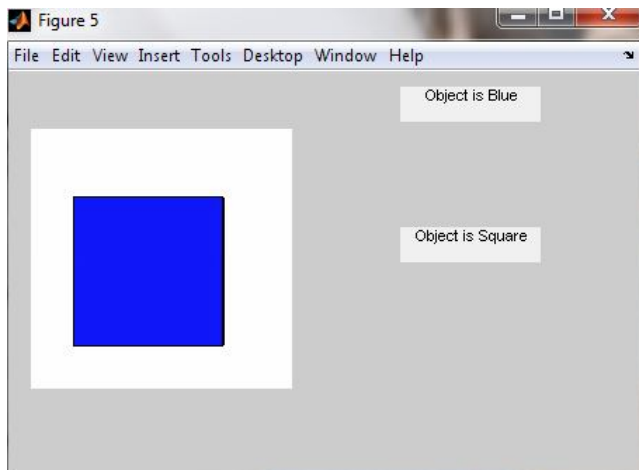
Here, first the area of the captured image is calculated. This area is then compared with the stored area A1, A2, A3. According to that the command is given to the placing assembly.

4.2.3. Execution:

If the captured images area matched with the reference parameters then object is sorted according to that. A1= Square (area above 90%),

A2 = Circle (area 70- 90%),
 A3 = Triangle (area below 70%).

V. RESULT



V. APPLICATIONS

- Construction industry
- Power industry

- Cellulose industry
- Steel/metal industry
- Foodstuffs industry

VI. FUTURE SCOPE

After fabrication and testing and further improvements, this project can be produced on mass scale to be implemented in various industries like

- Food and Beverage
- Packaging
- Machinery parts
- Vehicle and engine parts

This project can be further extended for the sorting of objects on the basis of:

- Size
- Weight

VII. CONCLUSION

Hence, an object sorting system for domestic/industrial control has developed using the concepts of Image Processing. The model developed is user friendly.

We conclude that for fast manipulation the algorithm implemented in the MATLAB® is suitable for our sorting problem. Result of sorting the object may not work for 100 percent but it is working for nearly 90 to 94% in case of our algorithm. It can be improved by increasing the accuracy and it depends on atmospheric fact

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