MULTIPLE OBJECT RECOGNITION ROBOT

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Abstract— Object recognition and detection in noisy and cluttered photographs is a challenging difficulty in PC vision. The objective of this system is to identify the different objects using some technique such as color and shape detection. Colour processing use thresholding technique to remove the unwanted color or item in images. The project discusses an technique involving image processing and symmetrical logic for detection of two dimensional shapes of objects such as squares, circles, rectangles in addition to the color of object (red, green, blue). Color is the most significant key factor to differentiate amongst different objects. By detecting colour we can perform different activities such as recognizing, sorting and tracking. Generally camera is attached at the place where we want to discover the object. This arrangement can be useful in equipment handling in logistics **and packing industry where the objects moving on a conveyer belt. They can be separated using a colour and shape detecting robot. In our project the algorithm is written in MATLAB for performing the task recognization. This methodology can be increased to applications like robotic vision and computer intelligence. The algorithm is simulated and developed using the software called MATLAB.**
Different geometric shapes (e.g. circle, triangle, rectangle) and red, green, blue these three primary colors are used for analysis. Three dimensional RGB picture to two dimensional black and white picture conversion method is used for color detection. The recognition of shape of the particular object is made through using eccentricity calculation.

Index Terms—**Thresholding ,GUI, distance finding.**

I.INTRODUCTION

In today's extremely automated and advanced industries, extremely efficient methods are use for various inspection and production processes. There was time when banal works, like sorting, assembly, quality inspection, painting, packaging etc. were done manually. But after the rapid involvement of the field of robotics, the automation industry has undergone a complete makeover. The technology of object recognition for a real world application field has developed actively for many years.
A single object is detected based on segmentation using threshold, background subtraction model and background estimation techniques and by extracting different feature of the object. Vision-based object recognition has processed by extracting object shape, edge or landmark features using 2D or 3D vision sensors. The sensors play an important role in presenting information related to the parameters in a running process. Temperature, light, percentage composition, humidity, structure shape, dents etc. are the many examples of parameters that sensors can detect. Extremely precise sensors are used in industries to provide better feedback to controllers. For example, the more the precision of the sensors, the

more is the ability of the sensor to detect a flaw. The field of Digital Image Processing has found many applications in the field of automation. Sensors like cameras acquire live video feed or image of the objects moving on the conveyer belt. The video or image is then used to recognize the object, or in some cases, compare the object with a predefined, flawless and expected object and a decision is made based on the degree of similarity between the two images. A controller controlling a robotic arm then either allows the qualified object to pass or picks and places the unqualified object into the rejected bin. This project attempts to demonstrate the recognition of basic geometrical objects using the colour and shape detection as will be explained in detail. Image filtering has been used to detect more accurate object. Filter used is the median filter.
 MATLAB software is used as a tool to achieve the goal of this project. MATLAB software is one of the most powerful software using worldwide and it also consist a lot of image processing library which can be use for object detection. For this project, the program code is writing using this software and it shall be efficient to detect the objects, eliminate the background image and detects the object.

3. LITERATURE SURVEY

Previously quality inspection, sorting, assembly, painting, packaging etc.were done manually. But after the rapid involvement of the field of robotics, the automation industry has undergone a complete makeover and the technology of object recognition is used for such work.
A number of object recognition algorithms have been proposed in the past. A detailed survey of shape recognition algorithms can be found in " Pattern Matching Using Similarity Measures", by M. Hagedoorn, PhD thesis, Universiteit Utrecht, 2000.and "State of the Art in Shape Matching", Technical Report, by R. C. Veltkamp and M. Hagedoorn, Utrecht, 1999.
Color is also the most common feature to distinguish between objects, sorting, recognizing and tracking Swain, M., and Ballard, D. Color indexing. International Journal of Com- puter Vision (Jan 1991) give the information about colour recognitions.
This technology can be used in material handling in logistics and packaging industry. The 'Object recognitions' algorithm is executed to identify the object and send the appropriate commands to the microcontroller using serial communication for the robot to perform the sorting operation. In our project we are going to detect the different object by using different feature of the object such as colour and shape of the object. To detect the particular primary we are using simple thresholding technique.

SYSTEM OVERVIEW

In image processing field images are more important. Image features are important in tracking, detection. select proper image could increase the experimental accuracy. image features are differentiated in two groups, frequency features.

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Texture is one of frequency features of smoothness .edge and color are examples of
amplitude features. From edge the object shape or size can be determined. the overall scenario is discussed in fig given below.
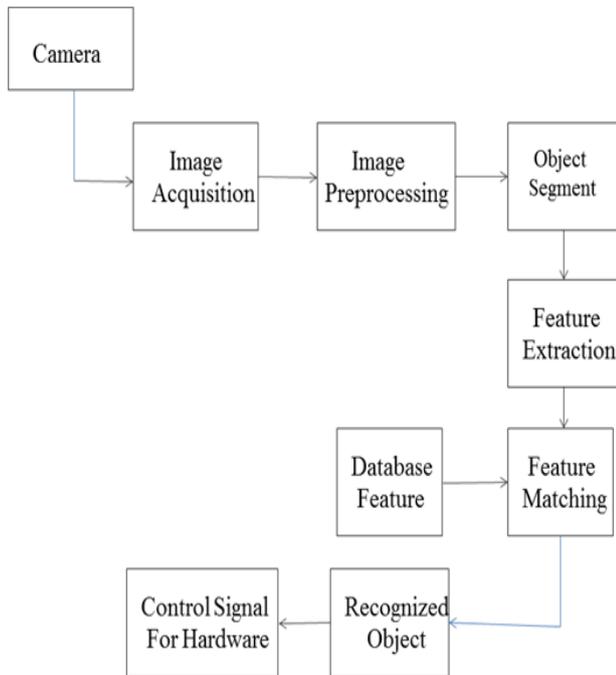
Camera is used for catch the snapshot of the different elements/objects which has to be detect, as a sensor. The sensors play an significant/important role in presenting data/information related to different parameters in a running process. Light, Dents, Percentage composition, Temperature, Humidity, Structure shape etc. are different examples of the constraints that sensors is able to detect.To provide better/improved feedback to the controller highly accurate sensors are used in different industries. For example, the more the precision of the sensors, the more is ability of sensor to detect flaw. Field named as Digital Image Processing has found many applications in the arena of automation. Sensors such as camera acquire image or live video feed of objects travelling on conveyer belt . Then for object/element recognition , captured image or video is used and in some circumstances it can be used to compare the object with some predefined standard value, flawless and decision is made based on degree of of similarity between the two images.

Image Acquisition-To obtain images and video from cameras and To frame grabbers straight into a MATLAB, a toolbox called image acquisition is used . You are able discover hardware automatically in the matlab by using some instruction and organize hardware properties. Innovative workflows let you initiate acquisition when processing in the ring/loop, perform synchronize sampling, and background acquisition across some multimodal devices. With support for various hardware merchants and firm/industry standards you can use devices ranging from low-cost, reasonable web cameras to high-end scientific , industrial devices which meet high speed, low light, and other additional challenging requirements .

Image Pre-processing-First image is sent through the preprocessing block where the image has to be improved or enhanced for increasing the contrast of image. There are number of difficulties in identifying the objects from complex background .Firstly , target object may get interfered with other objects such as leaves, stems.
Second, captured image itself possibly will contain noise which makes the object recognition procedure more difficult without the pre-processing and image segmentation stages . Third, the targeted objects might get overlapped, which makes the recognition procedure challenging . Hence to obtain better image detection and to reduce noise, image preprocessing is necessary.

Noise Filtering-Noise from image must be removed for good accuracy. In our project we are removing ' Paper and Salt Noise ' . This noise can be removed by using Median Filter.
Median filter divides image in fixed size box known as Neighbourhood. Median filtering is a nonlinear process regularly used in image processing to reducing "salt and pepper" noise . Median Filter replaces middle value of 'M' by 'N' neighborhood of its median value . If neighborhood has centre element, the block places median value there.
value of pixel in centre has been exchanged by average of all neighbourhood pixel values. If the neighbourhood does not have an exact centre, the block has a bias toward the upper -left corner and places median value there. The block pads edge of input image so, pixels with in [M/2 N/2] of edges might look distorted. Because median value is a lesser amount of sensitive than mean to extreme values, Median filter block is able for remove salt as well as pepper noise from an image without significantly decreasing sharpness of the image . Median filtering can be done easily by using ' medfilt2' function.

Segmentation-Now, the image segmentation has to be carried out . The edge detection, colour processing, feature extraction had been employed for perform segmentation. Feature extraction process as well as edge detection process is very important.
Next in the color processing block the unrelated color and unrelated object has to be removed from the original image . The elimination of the unrelated object can be achieved using thresholdingaction . Edge detection is carried by using or calculating perimeter of the binary image. For detecting the shape (such as circle, rectangle) of the object different geometric parameter are calculated. These parameter are area, eccentricity, and perimeter.
If the calculated eccentricity is between 0.4 to 0.7 then object is consider as circle. If the calculated eccentricity is less than 0.4 or greater than 0.7 then object is consider as rectangle.

Algorithm :

1. Start
2. Image Acquisition.
3. Image Pre-processing.
   a) Noise Reduction (using median filter)

4. Thresholding based Object Segmentation
5. Object Colour Recognition (feature extraction)
   a) Red

   b) Green

   c) Blue

6. Object Shape Recognition (feature extraction)
   a) Sphere

   b) Rectangle

7. Feature matching of object
        Hamming distance
8. Result (recognized object)
9. Generating Control signals from recognized colour and shape for sorting
10. Repeating step 2 to 9 till exit.
11. Stop

5 RESULTS

a. Description of scenario 1:

In this scenario firstly MATLAB and video tool kit is used . here the camera is used is used which is fixed at the position where the object are travelling on conveyer belt. In this scenario we capture image and image acquisition is done . By taking snapshot capture path.

The capture image and median filter image is shown below :
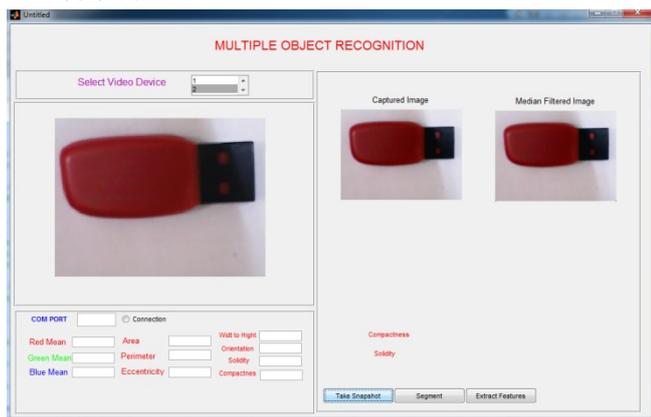

Fig : capture image

b. Description of Scenario 2:

From 1 st scenario we capture image .weshown this images in GUI . GUI stands for Graphic User Interface. Binary image and segmented image is shown below:
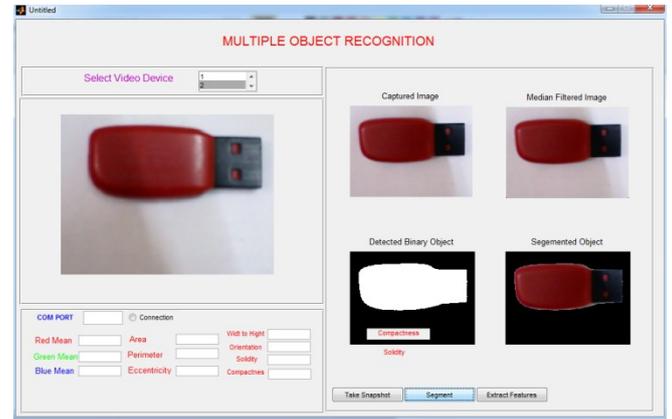

Fig : Segmented image

c. Description of Scenario 3:

extractedfeacture of the detected object is shown in above figure.

a. LCD output-

After image processing .the name of object detected is displayed on LCD .

sFig.4 LCD output

I. **CONCLUSION**

The perpose of our project is to detect the object by detecting colour as well as shape of the object. Segmentation of object is done by using the edge detection, colour processing, and feature extraction. Colour processing eliminates the unrelated colour or the background image.
The project shows the percentage of each primary colour and depending upon that percentage the colour of the particular object is detected.

REFERENCES

[1] K. Rahardja and A. Kosaka, "Vision-based bin-picking:Recognition and localization of multiple complex objects using simple visual cues", IEEE Proc. of International Conference on Intelligent Robots and System, vol. 3. pp. 1448-1457, 1996.

[2] J. Z. Liu and W. Q. Li, 1993. "The automatic thresholding of gray-level pictures via two-dimensional Otsu method," IEEE Int. Computer Vision and Pattern Recognition.

[3] R. C. Veltkamp and M. Hagedoorn, "State of the Art in Shape Matching", Technical Report, Utrecht, 1999.

[4] G. Scott and H. Longuet-Higgins, An Algorithm for Associating the Features of Two Images, Proceedings Royal Society London, vol. 244, pp. 21-26, 1991.

[5] J. L. Vincent, "Morphological Grayscale Reconstruction in Image Analysis: Applications and Efficient Algorithms", IEEE Transactions on Image Processing, vol. 2, pp. 176–201, 1993.

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