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Object Detection and Colour Based Tracking

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Abstract*: Object detection and tracking has been widely used in diverse discipline such as intelligent transportation systems, airport security systems, video monitoring systems, and so on. Feature matching uses feature framework for detecting frame similarities in a video input. In our proposed algorithm, we intend to take video input from a camera, select the appropriate portion of the current video frame as our area of interest and treat that portion as the object. Similar objects in multiple frames are found out by comparing points/features of the selected area of interest and the features in the next frame. Similarities between point/features will help us to determine the position of our object. Object tracking is done using controller based mobile robot. Area as well as centroid of object is calculated. Area of object is calculated which helps object to move forward and backward. Centroid calculation helps robot in left and right movement. Simulation results indicate that the proposed method consistently performs well under different illumination conditions including indoor, outdoor, sunny, and foggy cases.
Keywords: Open CV software, Raspberry-pi,Wifi Module, DC motors, Camera module ,Robot chassis, DC motor driver

I. INTRODUCTION

Every tracking method requires an object detection mechanism either in every frame or when the object first appears in the video. A common approach for object detection is to use information in a single frame. However, some object detection methods make use of the temporal information computed from a sequence of frames to reduce the number of false detections. Moving object detection is simply based on a comparison between the input frame and a certain image, and different regions between the input and the model are labeled as foreground based on this comparison. This assessment can be the simple frame differencing, if the background is static (has no moving parts and is easier to model). However, more complex comparison methods are required to segment foreground regions when background scenes have dynamic parts, such as moving tree branches and bushes. There are various algorithms, which can cope with these situations.

II. OBJECT DETECTION ALGORITHM

A. Feature Detection Algorithm

Feature matching is the chosen algorithm as it include or multiple objects in static as well as moving background environment. It is at the base of many computer vision problems, such as object recognition or structure from motion. Current methods rely on costly descriptors for detection and matching. We propose a very fast binary descriptor based on BRIEF (Binary robust independent elementary features), called ORB (Oriented fast and rotated BRIF), which is rotation invariant and resistant to noise. ORB is at two orders of magnitude faster than SIFT. The efficiency is tested on object detection. ORB features and BF matcher are used.

The system detects a particular object in cluttered scenes, given a reference image of the object. The chapter presents an algorithm for detecting a specific object based on finding point correspondences between the reference and the target image. It can detect objects despite a scale change or in-plane rotation. It is also robust to small amount of out-of-plane rotation and occlusion.

B. Algorithm Implementation

Firstly, Read the reference image containing the object of interest and target image containing a cluttered scene. After reading reference and target image perform feature detection process on both images. Feature detection is the process where we automatically examine an image to extract features, which are unique to the objects in the image, in such a manner that we are able to detect an object based on its features in different images.

C. Detection

Automatically identify interesting features, interest points this must be done robustly. The same feature should always be detected regardless of viewpoint.

1) *Description:* Each interest point should have a unique description that does not depend on the features scale and rotation.
2) *Matching:* Given input image, determine which objects it contains, and possibly a transformation of the object, based on

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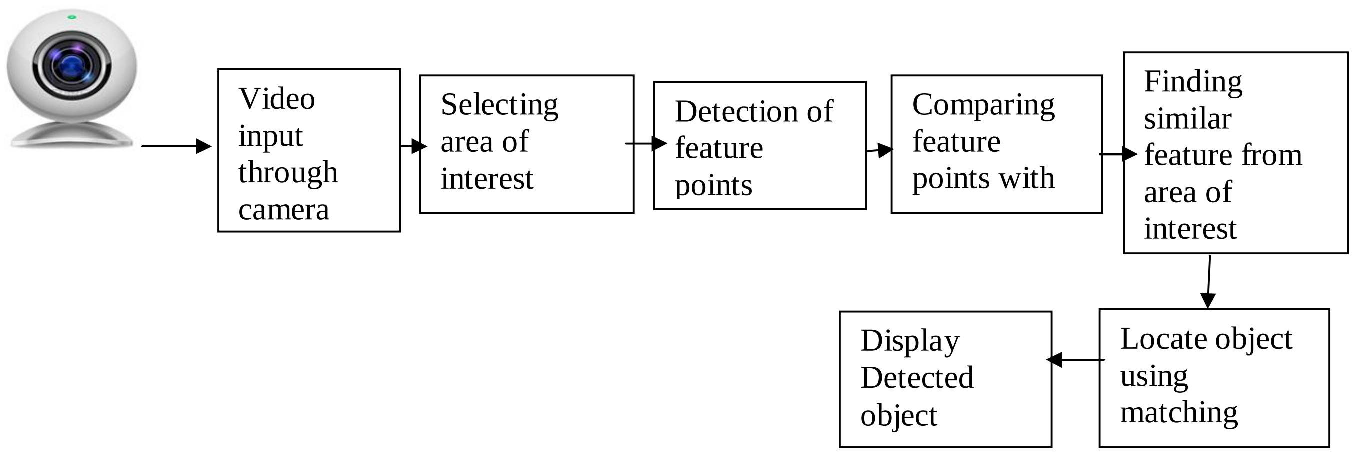
predetermined interest points.

In our system ,we propose a very fast binary descriptor based on BRIEF, called ORB, which is rotation invariant and resistant to noise. BRIEF is a recent feature descriptor that uses simple binary tests between pixels in a smoothed image patch. BRIEF grew out of research that uses binary tests to train a set of classification trees. Once trained on a set of 500 or so typical key-points, the trees can be used to return a signature for any arbitrary key-point. In a similar manner, we look for the tests least sensitive to orientation. The closest system to ORB, which proposes a multi-scale Harriskey point and oriented patch descriptor. This descriptor is used for image stitching, and shows good rotational and scale invariance.

D. Block Diagram for Point Feature Matching

The project is implemented in two phases. Initially a software program is developed for object detection and tracking using appropriate algorithm in OpenCV preferably using Python language. Software section includes writing the code, interfacing camera and running the code on Raspberry Pi. Second phase that is hardware part deals with the actual implementation in terms of some working model.



E. Results of Implemented Algorithm

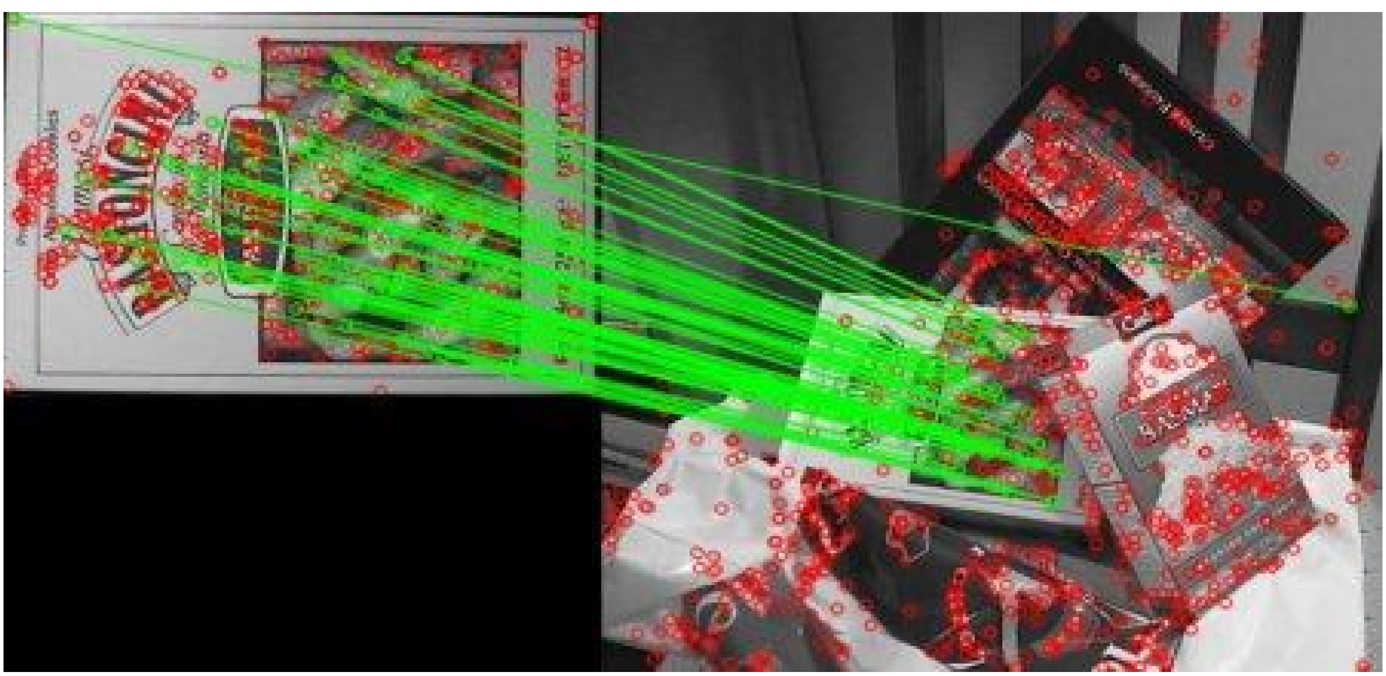


Fig 2.6.1: Typical matching result using ORB on real-world images with viewpoint change.

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Fig 2.6.2: Feature points

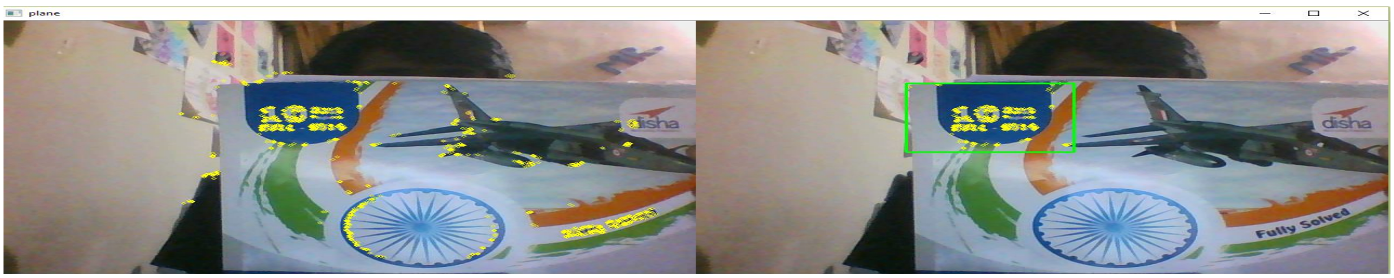


Fig 2.6.3: Desired object

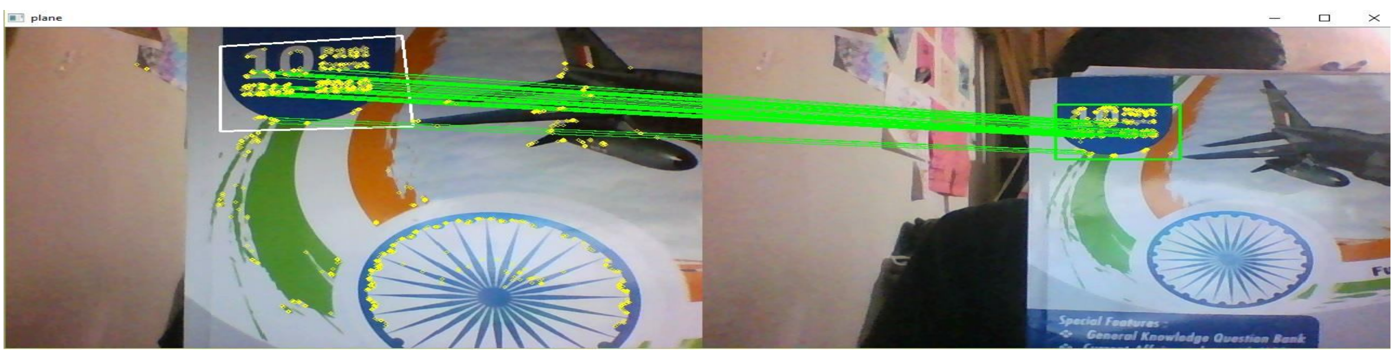


Fig 2.6.4: Detection in normal plane

F. Color based Tracking Algorithm

In order to track the object, we have used “Moment” function which calculates the moments of positive contour (white) using an integration of all pixels present in the contour. It is given by moments = cv2.moments (image, True).

In our proposed idea, it was necessary to find the area of the contour and its location coordinates in the frame in order to move hardware chassis. The calculation of the area of the object performs the generation of the variable M00 and recorded in the variable "area". This value is used to find an approximate area of positive pixels (white) that make up the object. Using this feature will help to accomplish the movement of the robot approaching the target object and from the area we define the coordinates(x & y) of the object in the frame. The coordinates(x & y) of the object was used as a parameters for the calculations of centroid.

1) Algorithm Implementation:

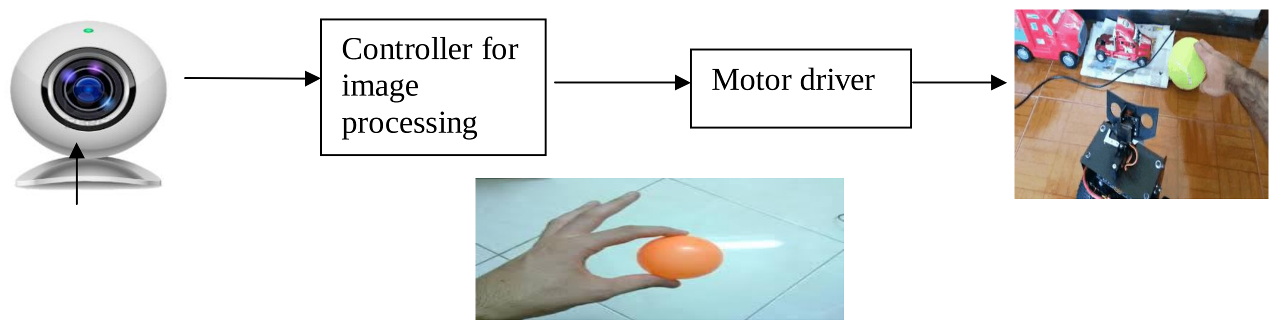
a) Forward and Backward Movement: Forward and backward motion of robot is totally based on the area of object. We coded the code in a such way that whenever the object comes near to camera the robot will automatically move backward upto certain limit. For this backward motion we have defined specific threshold limit of area.

Similarly for forward motion whenever the object goes far from the camera frame, it would automatically move forward in order to maintain some proper distance from our proposed object.

b) Left and Right Movement: The co-ordinates calculated for the centroid of the area will be used for turning the object sideways. X Co-ordinate of centroid (x ,y) will be tracked in the frame which will facilitate the movement. Since the frame is of size 120*160, x co-ordinate will have a value between 0-120 starting from the left to right of the frame.

The frame has been divided in to 5 sections of 24p each which indicates the area of the frame in which the object is present. Say for example if the x coordinate in less than 48, it indicates that the object is moving to the left side of the. Similarly if the coordinate is more than 96 it indicates the object is moving to the far right corner. Monitoring the x coordinate is the primary attribute in sending commands to the motor to move left or right accordingly.

G. Block Diagram for Object Tracking



III. CONCLUSION

We have implemented Point feature matching algorithm. Feature matching detects objects despite of scale change or in plane rotation. It is also robust to small amount of out-of-plane rotation and occlusion. This method of object detection works best for objects that exhibit non-repeating texture patterns, which give rise to unique feature matches.

A basic study of various features used has been done. The object tracking algorithm and implementation on the hardware has been done. OpenCV produces a valuable and cost efficient platform for image processing techniques making it an easy to understand module which has been installed on all our devices including the Raspberry Pi. Image processing can vary depending upon the conditions and creating a suitable algorithm for all environments will be a tough job. Adding more features or details about the object will help us in recognizing the object far more superiorly but sometimes programming capability may be out of scope of this project. Object recognition and tracking is a field which involves constant change depending on the nature of the object. It can be used in many areas such as surveillance systems, Object recognition and as an aid for the visually impaired etc.

REFERENCES

[1] Vindhya Devalla et.al, “Design nd Development of Object Recognition & Sorting Robot for Material Handling in Packaging and Logistic Industries”, in International Journal of Science & Technology, ISSSN 2221-8386 ,Volume 2,Issue 9, September 2012.

[2] Detecting Specified Object from a Cluttered Data in a Live Video Using Rotation Invariant Detector and Descriptor",International Journal of Advanced Research in Computer Science and Software Engineering,Volume 3, Issue 12, December 2013

[3] Rupesh [3].Kumar Rout “A Survey on Object Detection and Tracking Algorithms”,submitted to National Institute of Technology Rourkela ,June 2013

[4] Budi Sugandi, Hyoungseop Kim, Joo Kooi Tan, and Seiji Ishikawa. Tracking of moving objects by using a low resolution image. In Innovative Computing, Information and Control, 2007. ICICIC’07. Second International Conference on, pages 408–408. IEEE, 2007.A

[5] Marius Muja and David G. "Fast Matching of Binary Features",Lowe Laboratory for Computational Intelligence University of British Columbia, Vancouver, Canada.A

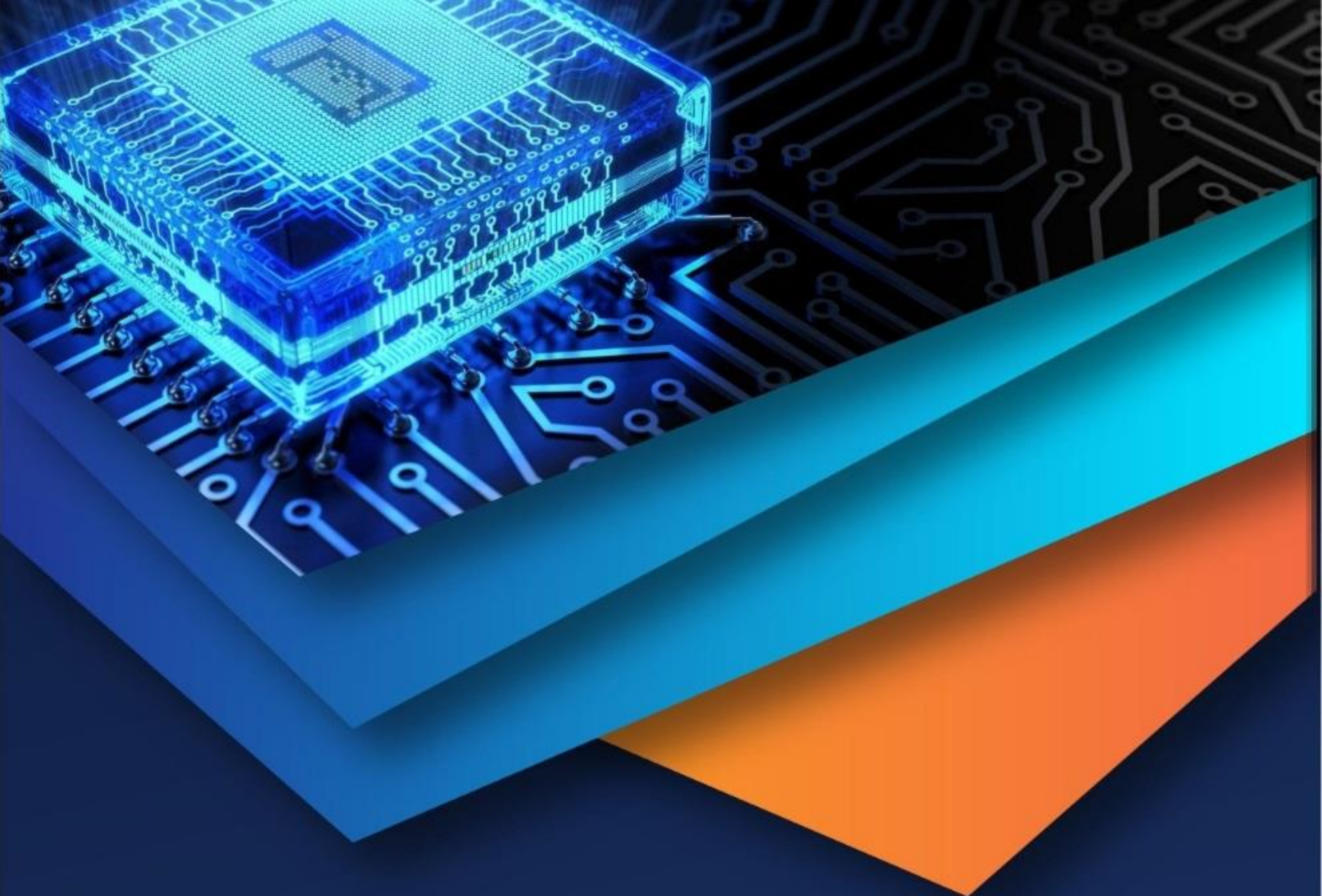
[6] E. Rublee, V. Rabaud, K. Konolige, and G. Bradski, “ORB: an efficient alternative to SIFT or SURF,” in International Conference on Computer Vision, Barcelona, 2011

[7] S. Leutenegger, M. Chli, and R. Siegwart, “BRISK: Binary Robust Invariant Scalable Keypoints,” in IEEE International Conference on Computer Vision (ICCV), 2011.

[8] V. S. Krishna, Ravi Kumar,"Detection of Objects in Cluttered Scenes using Matching Technique" ,MRITS, Secunderabad, AP, India. in IJECT Vol. 5, Issue Spl - 3, Jan - March 2014

[9] M. Aly, P. Welinder, M. Munich, and P. Perona. Scaling object recognition: Benchmark of current state of the art techniques. In First IEEE Workshop on Emergent Issues in Large mounts of Visual Data (WS-LAVD), IEEE International Conference on Computer Vision (ICCV), September 2009.

[10] Feature detection Wikipedia, the free encyclopedia”, 2011.



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