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Detection of a Specified Object with Image Processing and Matlab

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Abstract: This research expresses how to detect an interested object in the cluttered scene images with image processing. Detection of an object in cluttered scenes is a fundamental challenge that has only recently been widely undertaken by computer vision systems. Firstly, the research is to detect and extract the features or key pointsof specified or interested object which can change scale, rotation, viewpoints and illumination with Hessian Matrix Operator and Haar wavelet response, and the features detected of the interested objectare matched with the feature points of the cluttered scene images. And the algorithm will identify the interested object depending on the matching points between the interested image and cluttered scene image by using image processing and MATLAB R2014a. This matching method can be used to recognize and identify the objects for robot applications and also work well to detect objects containing the repeating patterns.
Keywords: Specified object, Matching, SURF, Detection and Extraction.

1. INTRODUCTION

Vision systems are increasingly used in the fields of industrial automation and home robotics. Object learning and detection are important and challenging tasks in Computer Vision. Among the application fields that drive development in this area, robotics especially has a strong need for computationally efficient approaches, as autonomous systems continuously have to adapt to a changing and unknown environment, and to learn and recognize new objects [1].

In image processing, point feature detection is an effective method to detect a specified target in a cluttered scene. Regarding specified, this method is to detect one specific object instead of that kind of objects. For instance, a specified object can able to recognize in a cluttered scene by using this method [2].

The algorithm of this method based on comparing and analyzing point correspondences between the reference target image and the cluttered scene image. If any part of the cluttered scene shares correspondences greater than the threshold, that part of cluttered scene image will be targeted and could be considered to have the reference object there [2].

The goal of this paper is to develop an effective algorithm to help people with visually impairments to find personal items such as keys, wallets, sunglasses, cell phones, and other objects. In this paper, a method to identify objects in the cluttered images using feature detection is introduced [3].
by using this method

Figure 1.block diagram of the System

2. SURFFEATURES OVERVIEW

In computer vision SURF is patented as local feature detector and descriptor. SURF detector has been used to locate and recognize objects. SURF was first presented by Herbert Bay at 2006 European Conference on Computer Vision [4]. Interest points are detected using SURF method in which determinant of Hessian and Blob detector approximate values are calculated. Its feature descriptor is based on sum of the Haar wavelet response around the point of interest. SURF algorithm is implemented in three divisions as Interest point detection, local neighborhood description and matching.

2.1. Interest Point Detector

The image of an interested object in the cluttered scene image is in various forms with their scale, rotation noise and illumination and without deforming. So, the interest points of an interested object were

detected by using SURF Hessian matrix. By using Hessian matrix can be good in time reducing, performance and accuracy for interest point detection

2.1.1). Hessian matrix Operator

Hessian-matrix operator is selected to choose the interest objectbecause its points change noise, scale, rotation and illumination invariants object in a form of many variables an interested image.It is again not a Blob Detector by itself but it is used as part of some of them.

2.2. Descriptor

Descriptor is to provide a unique and robust description of an image feature. The dimensions of the descriptor have direct impact on its computational complexity as well point-matching as well as accuracy. The first step is to fix a reproducible orientation based on information from a circular region around the interest point. Then a square region aligned to the selected orientation is found, and the SURF descriptor from it is extracted [3].

2.2.1. Haar wavelet response

Haar wavelet response can descript and extract the pixel points of interest point from interested image and cluttered scene images. And, lower the dimension, higher the speed of computing matching, but provide better distinctiveness of features or the comparison and matching of an interested image and the cluttered scene images.

2.3. Feature Matching

It will not be easy to find the corresponding key-point if the key-point of an interested object will change with scale, rotation, viewpoints and illumination. But in this research, the matching a correspondences feature of the interested image and cluttered images is one of the important tasks in many computer vision applications.

3. PROPOSED METHODOLOGY

In Proposed method as shown in figure 2, at first step, the interest point for a specific object and cluttered scene images has been detected with SURF point's detection, these points with information about features also called blob features. The strongest features by attend a specific threshold and selection criteria then all features are return represent the strongest features for our interest object and origin image.

Then in second step, feature descriptor also called features vector are extracted from pixels that surrounding an interest point. Pixels represent the match features specified by single point location and this specifies the center location of neighborhood pixels. The strongest feature point (interest point) descriptors also called object representative points are received because its carry information that can distinguish and recognize it.

Third step is a matching step that match features from first set of (object image) to second features set (cluttered scene image). Matching step returns the indices of the matching features for tow features set. Second Threshold presents to evaluate the matching features, some of these features in specific object image must be matched the features in cluttered scene image. In order to specify the object in the cluttered scene images, the detail methodology is expressed in the following below.

Step 1: Reading to detect an interested object in the cluttered scene Images
Step 2: Preprocessing the specific object and cluttered scene images.
Step 2: Detecting feature points of an interest object and the cluttered scene images
Step 3: Extracting the features of the images
Step 4: Matching the point features of the images
Step 5: Locating the object in the Scene Using putative matches
Step 6: Displaying the identified object

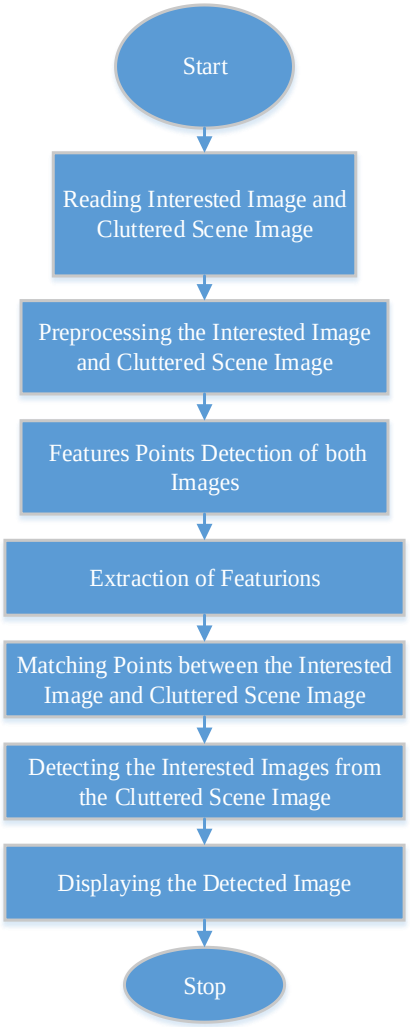

Figure 2.flow chart of an interested image in the cluttered scene images

4. EXPERIMENT RESULTS

Inthispaper,a specified object detection and identification in cluttered scene images used SURF algorithm with MATLAB R2014a. These results are shown in the following figures.

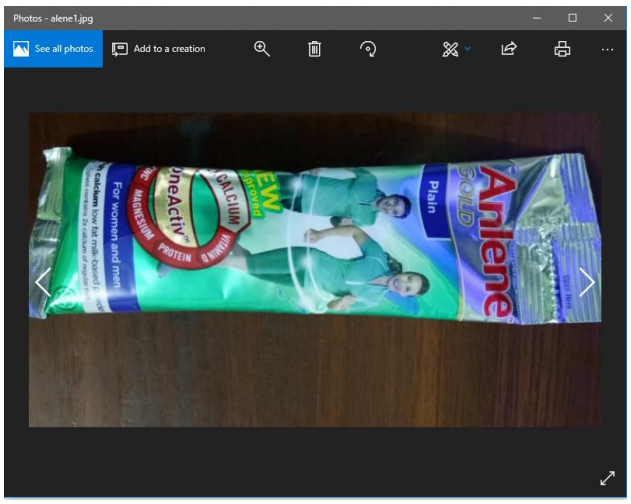

Figure 3.an interested RGB color image

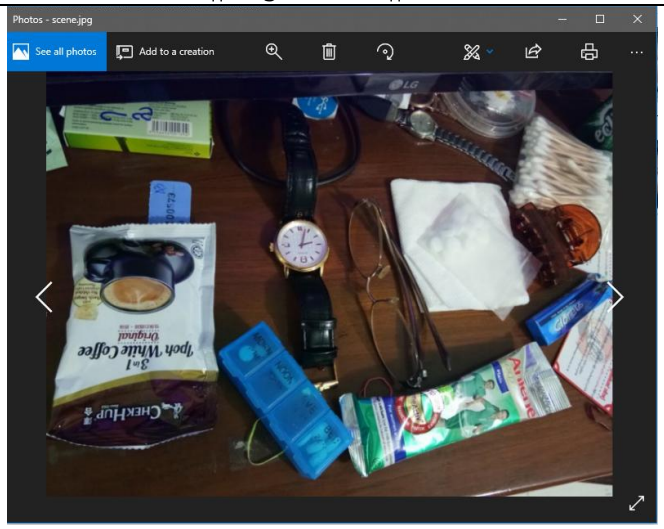

Figure 4.cluttered scene RGB color images

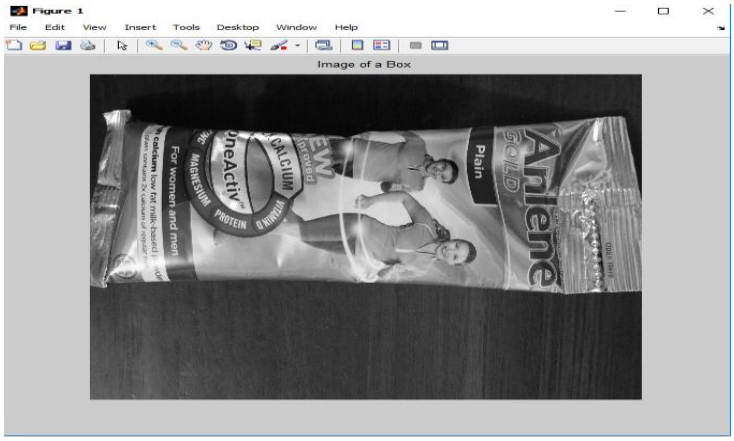

Figure 5.an interested image with gray color

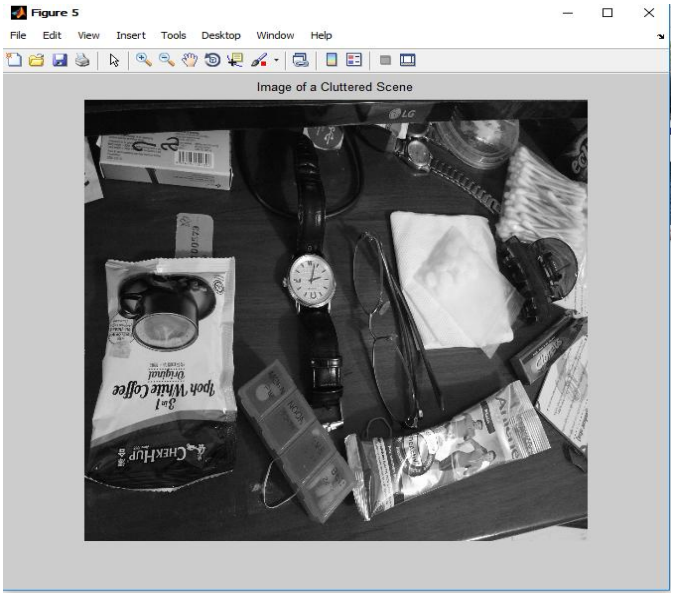

Figure 6.a cluttered scene image with gray color

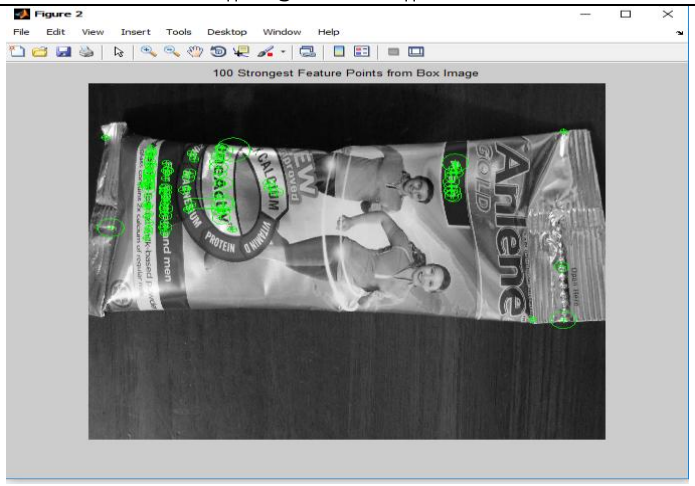

Figure 7.detection result of an interested image by Using SURF algorithm

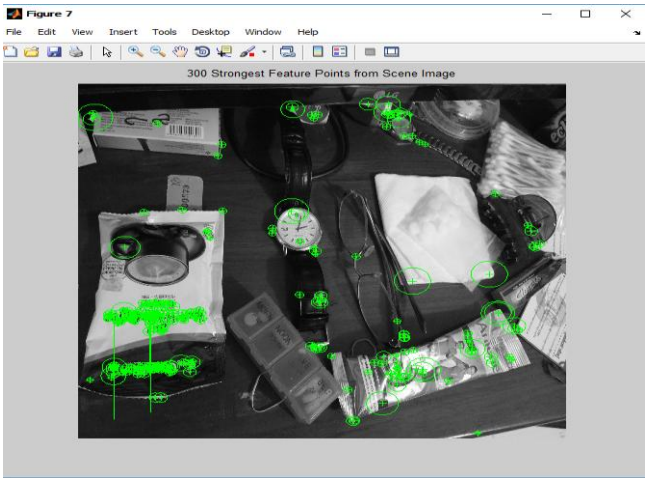

Figure 8.detection result of cluttered scene image by using SURF algorithm

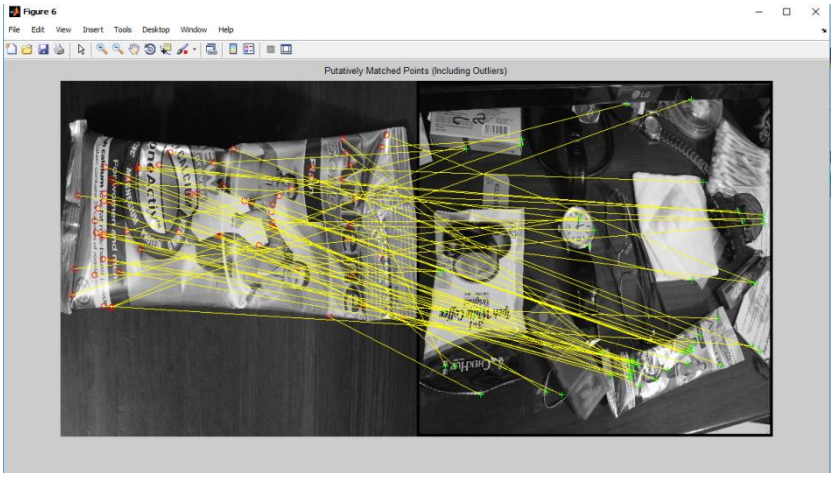

Figure 9.result of point features matching (including outliers)

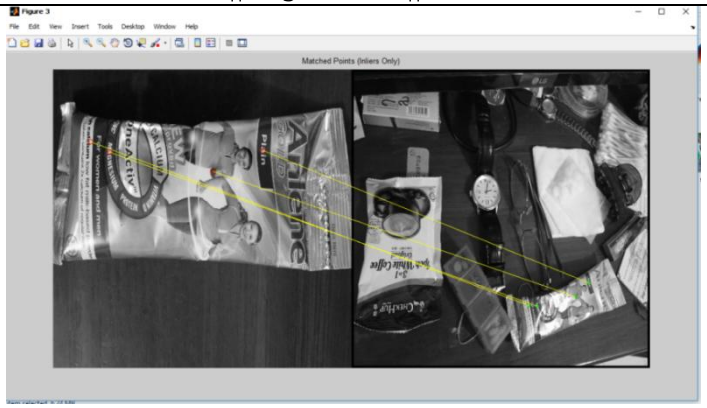

Figure 10.result of point features matching (inliers only)

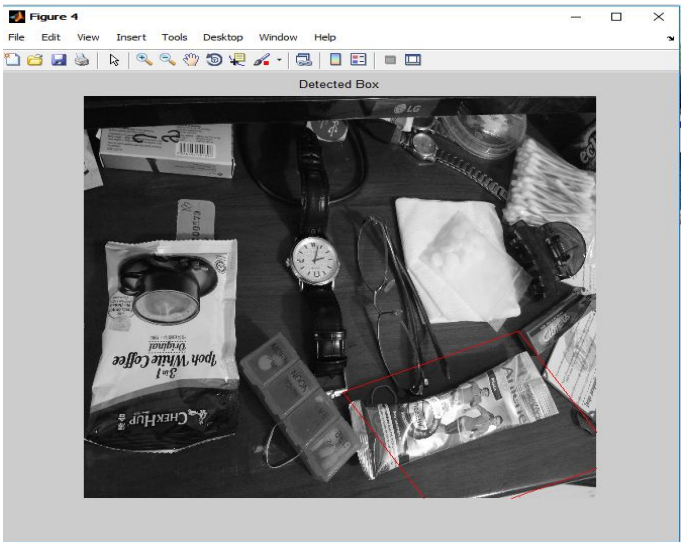

Figure 11.detection of an interested output result with point matching

5. CONCLUSION

Proposed method for detection the specific object in the scene is based on SURF algorithm, we enhanced the performance of object detection by selecting the strongest features descriptor, our proposed method it's successfully detect the specific object image and matches score for object in the scene. Many real time applications that use SURF algorithm can detect objects by visualize mode, our model calculate many information that used through object detection. Matching score can represent interest value for how much accuracy our selected parameters were affected and also support the accuracy for detection interest objects.

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