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PLANER OBJECT DETECTION USING SURF AND SIFT METHOD

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Abstract: **Object Detection refers to the capability of computer and software to locate objects in an image/scene and identify each object. Object detection is a computer vision technique works to identify and locate objects within an image or video. In this study, we compare and analyze Scale-invariant feature transform (SIFT) and speeded up robust features (SURF) and propose a various geometric transformation. To increase the accuracy, the proposed system firstly performs the separation of the image by reducing the pixel size, using the Scale-invariant feature transform (SIFT). Then the key points are picked around feature description regions. After that we perform one more geometric transformation which is rotation, and is used to improve visual appearance of image. By using this, we perform Speeded Up Robust Features (SURF) feature which highlights the high pixel value of the image. After that we compare two different images and by comparing all features of that object from image, the desired object detected in a scene.**

Keyword: **Object Detection: SURF, SIFT.**

I. INTRODUCTION

In the area of intelligent systems, the mobile robots are expected to have the ability to recognize their surrounding environment in real time. Object Detection refers to the capability of Computer and software to locate objects in an image/scene and identify each object. When humans look at image or videos, we can recognize and locate objects of interest within a matter of moments. The goal of object detection is to replicate this intelligence using a computer. And to achieve these, there are several algorithms have been proposed during the last several years.

Object detection is a computer vision technique works to identify and locate objects within an image or video. Specially, object detection draws enclosing boxes around these detected objects which allow us to locate where suppose objects are in a given scene. With this kind of identification and localization, object detection can be used to count objects in scene. It is usually utilized in applications like image retrieval, security surveillance and advanced driver assistance systems, face detection, vehicle detection, pedestrian counting. In this study, we compare and analyze Scale-invariant feature transform(SIFT) and speeded up robust features(SURF) and propose a various geometric transformation to deal with challenges faced by current methods.

The Scale-invariant feature transform (SIFT) is a computer vision algorithm to detect, describe and match local features in images. Applications include object recognition, robotic mapping and navigation, image stitching, 3D modeling, gesture recognition. SIFT key points of objects are first extracted from a set of reference images and stored in database. An object is recognized in a new image by individually comparing each feature from the new image to this database and finding candidate matching features based on Euclidean distance of their feature vectors. One major advantage of SIFT is it can generate large numbers of features that densely cover the image over the full range scales and locations.

The SURF method (Speeded Up Robust Features) is a fast and robust algorithm for local, similarity invariant representation and comparison of images. The main interest of the SURF approach lies in its fast computation of operators using box filters, thus enabling real-time applications such as tracking and object recognition. To detect interest points, SURF uses an integral approximation of the determinant of Hessian blob detector, which can be computed with 3 integral operations using a pre computed integral image. SURF descriptors have been used to locate and recognize objects, people or faces, to reconstruct 3D scenes, to track objects and to extract points of interest.

ORGANIZATION OF THE PAPER

This paper organizes as follows; section II covers the Literature review. Section III covers the result of proposed methodology which is carried out in MATLAB. Section IV covers the experimental results and section V is summarizes this project work in terms of conclusion and future scope.

II. LITRATURE REVIEW

There exit several studies for object detection or key point detection methods in image processing. Geng Du et al, 2009

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deals with using SURF features in face recognition and gives the detailed comparisons with SIFT features. Their experimental results show that the SURF features perform only slightly better in the recognition rate than SIFT.

B Bhosale, S Kayastha, K Harpal, 2014 deals with feature extraction using SURF algorithm for object recognition and gives the detailed information about the SURF algorithm. Their experimental results show that the object to be detected from the query image are first taken as an input image.

P Mandale, B Pahadiya,2016 deals with an advanced technique of image matching using SIFT and SURF and gives detailed information about the image matching, which is a method of identifying an image from the already stored images in the database. In this paper explains the improved method of image matching to enhance the performance of two well-known image matching methods SIFT and SURF. Their experimental result show that SURF algorithm is better than the SIFT algorithm in terms of speed and will give better matching.

Miriam Lopez-de-la-Calleja, Takayuki Nagai, Muhammad Attamimi, Mariko Nakano-Miyatake, 2013 deals with an object detection using SURF and Super pixels. This paper proposes a novel object detection method in which a set of local features inside the super pixels are extracted from the image under analysis acquired by a 3D visual sensor. Their experimental results show that the proposed approach provides fairly good object detection and confirms the superior performance of proposed scene.

Ebrahim Karami, Siva Prasad and Mohamed Shehata deals with the Image Matching using SURF, SIFT, BRIEF and ORB: performance comparison for distorted images. This paper shows that which algorithm is the best more robust against each kind of distortion.

III. PROPOSED METHODOLOGY

An image consists of various information`s like colors, textures, features, etc. To complete this proposed methodology we used two algorithm that is SIFT and SURF. First, take an original image then the image is converted in gray code, it is the process of converting an image from other color spaces. Then the gray code image is divided and reduced to more manageable groups and then need to match every point of image with original image and then matching points are display as dots and these dots are represented as number of key points in the image. after that we perform a geometric transformation on the image like rotation, when an image is rotated the new locations of some pixels may be outside the image for this, need to check the bounds of the calculated output coordinates. Then used Laplacian function which highlights a rapid intensity change of image. by using this, we perform SURF feature which highlights the high pixel object and make a one room of all the highlighted part. After that we compare two different images and convert it into grey code and then by comparing all features of that object from image, the desired object detected in the scene.

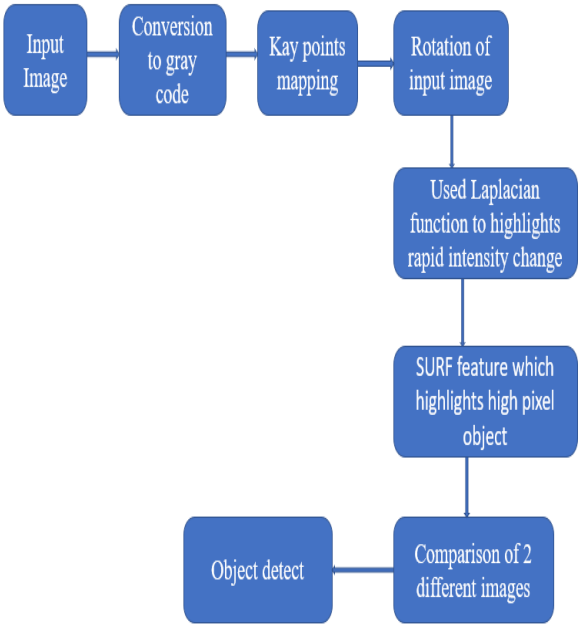

Fig. 1 Block dig of Proposed methodology

Proposed SIFT and SURF algorithms are explained as follows:

SIFT

David Lowe in 1999 gave the concept of Scale Invariant Feature Transform (SIFT). It is a computer vision algorithm to detect, describe and match local features in images. Basically, it has several applications such as object recognition, robotic mapping and navigation. SIFT consist of various steps of finding key points and descriptors.

- Feature point (also called key point) detection
- Feature point Localization
- Orientation assignment
- Feature descriptor generation

•Scale Space Extrema Detection
•Key point Localization
•Assigning an orientation to the found key points
•Generate SIFT descriptor

First, we use the Gaussian technique to reduce the noise in an image. Then then difference of Gaussian is a feature enhancement algorithm that involves the subtraction of one blurred version of an original image from another, less blurred version of the original.

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SURF

Herbert Bay, Tinne Tuytelaars, and Luc Van Cool in 2006 gave a concept of Speed Up Robust Feature. It is a patented local feature detector and descriptor. It can also be used for various purposes like face, object, fingerprint detection, logo matching and specially for the image matching. SURF consists of various steps of finding key points and descriptors.

- Feature Extraction
- Feature Description
- Key point Detection.
- Key point Description.

The approach for interest point detection uses a basic Hessian matrix approximation. SURF uses the Hessian matrix because of its good performance in computation time and accuracy. Then the integral image is used as a quick and effective way of calculating the sum of pixel values.

IV . EXPERIMENTAL RESULT

The Simulation is done in MATLAB. To show the behavior of algorithm SIFT and SURF for object detection we used one image which is having various deformations like scaling, rotation, Laplacian function, highlighting high pixel of image and comparison of two different images. As shown in fig. 2 the original image with multiple objects in it are taken as input image.

Input Image a b c

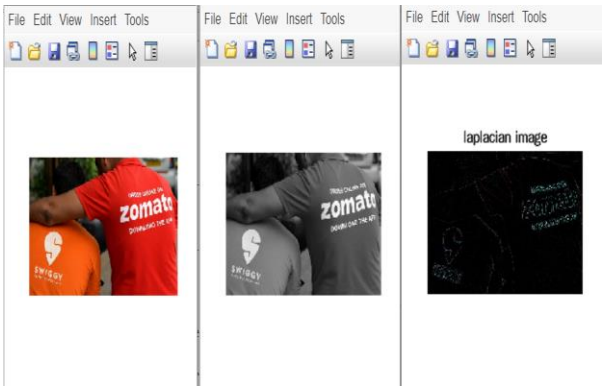
Fig.2: Scale Comparison

The first image is an input image and other three images are query images where (a) is conversion of input image into gray code, (b) is 1st octave generation in which we reduced pixel size and (c) shows the key point to know the matching rate.

Input Image a b

Fig.3 Rotation Comparision

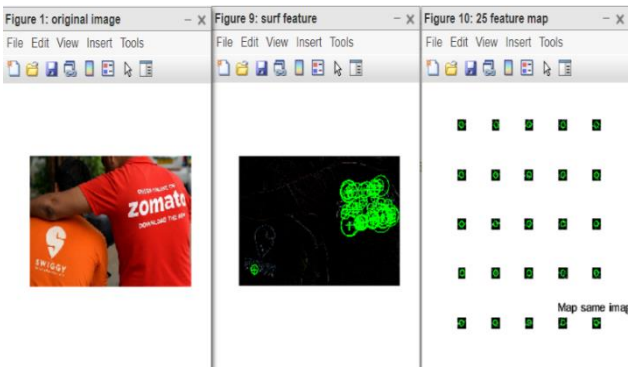
The first image is an input image and other three images are query images where (a) is conversion of input image into gray code and (b) image is rotated by 45 degree.



Input Image a b

Fig.4 Laplacian function

The first image is an input image and other three images are query images where (a) is conversion of input image into gray code and on the image (b) we apply Laplacian function to highlights regions of rapid intensity change.



Input Image a b

Fig.5 SURF feature

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The first image is an input image and other three images are query images where (a) highlights feature of image and (b) is make a one room of all the detected feature and after that it calculate the interest point of image.

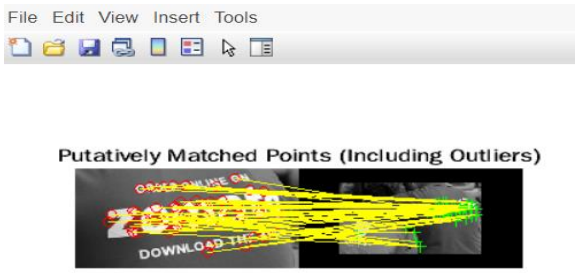

Fig.5 Comparison of two different images

Now in some cases, there are matched points which is outside the object called as outlier. In image it matched the every feature of both the image including outlier.

Fig.6 Object detection

At final stage by comparing all features of the object from image, the desired object detected in the scene.

V. CONCLUSION AND FUTURE SCOPE

This paper proposes two efficient methods for object detection which is SIFT and SURF. In this paper, we compare image matching techniques for transformations and deformations such as Scaling, rotation. Our approach can be used in road traffic or a security surveillance for a search task in a real time. Experimental results show the capabilities of proposed algorithm to detect a desired object. The SIFT algorithm is used in this scheme for key point detection and SURF algorithm is used in this scheme to highlights the high pixel part in the image.
This proposed idea can be enhanced with some advanced and extra features. We can use a conveyor belt for capturing images of objects that come directly out of the line. Our future scope is to use different algorithm on the same propose work which assure high accuracy to reduce computation time.

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