Chapter 4
Analysis of Different Feature Description Algorithm in object Recognition

Sirshendu Hore
HETC, India

Shouvik Chakraborty
University of Kalyani, India

Sankhadeep Chatterjee
University of Calcutta, India

Rahul Kumar Shaw
HETC, India

ABSTRACT

Object recognition can be done based on local feature description algorithm or through global feature description algorithm. Both types of these descriptors have the efficiency in recognizing an object quickly and accurately. The proposed work judges their performance in different circumstances such as rotational effect scaling effect, illumination effect and blurring effect. Authors also investigate the speed of each algorithm in different situations. The experimental result shows that each one has some advantages as well as some drawbacks. SIFT (Scale Invariant Feature Transformation) and SURF (Speeded Up Robust Features) performs relatively better under scale and rotation change. MSER (Maximally stable extremal regions) performs better under scale change, MinEigen in affine change and illumination change while FAST (Feature from Accelerated segment test) and SURF consume less time.

INTRODUCTION

Digital image processing makes the use of different algorithms to accomplish image processing on digital images. The object detection and extraction of feature from the object plays a vital role in case of digital image processing. To obtain some useful information from different digital media such as photo, video or any form of multimedia content digital Image processing relies heavily on feature extraction and object detection and subsequent object recognition. Successful and efficient object recognition is an important research domain in computer vision and image processing. Though object recognition has started it journey four decade back, it has started making its acceptance rapidly in recent years due to the advances in computational intelligence. It is also influenced by the advancement made in the field

DOI: 10.4018/978-1-5225-1025-3.ch004

of feature extraction techniques Object recognition is the process of determining the distinctiveness of an object being perceived in the image. This is often done using a set of known labels. Significant effort has been made earlier to develop some generic made to overcome the challenges often encountered in the case of object recognition. Recognition of object in cognitive way is much easier then recognizing the same object through computer vision or image processing. Pose of an object relative to a camera, variation in lighting under different condition, and difficulty in generalizing across objects from a set of images causes much difficulties in object recognition process. In the literature different way of recognizing an object is reported.

Feature

The concept of feature is very common and choice of feature to be obtained has been depended heavily on given specific problem. Thus there is no complete or precise definition of what make up a feature and the accurate definition often relay on the given problem; the application type In image processing or in computer vision a portion of information which is substantial for resolving the computational job associated with a certain application, can be coined as feature. On the other words a feature can be defined as an interesting section with in an image; interest points in an image are the area whose position does matter and can be detected under different changing circumstances. The noticeable part found within the interest points is that they store large number of local information and the information they store are rather same between different images; therefore many computer vision algorithms used features as a starting point. This concept of feature in general is also applicable in case of machine learning or pattern recognition . Features of digital image may have some precise structures in the image such as objects, points or edges. Features of any image can also be obtained by applying neighborhood operation in the adjoin region. In case of tracking a motion object it can be sequence of image, boundaries or curves of different image regions.

Feature Detector

In digital Image processing and in computer vision to find the interested point or key point of an object feature detector plays a crucial role. A feature detector is nothing but an algorithm that takes an image as input and produce pixel coordinates or locations as outputs. These locations are significant areas of the targeted image or inputted image. An example of feature detector is a corner detector, template detector, blob etc. that produce locations of corners or templates or regions as an outputs in the observed image but does not provide user any type of information about the features it detected.

Feature Descriptor

It has been observed that detecting interested points or key points in the inputted image most of the researchers in the field of digital image processing or in computer vision uses feature descriptor. Like a feature detector in case of feature descriptor an algorithm is used to take an image as input and produce feature descriptors/feature vectors as outputs. In Feature descriptors interesting information are encoded into a chains of numbers and used as a kind of numerical “template”. This template can be used to discriminate one feature from another. Unlike feature detector s information stored inside a feature descriptors are invariant under image transformation. Therefore we can retrieve the feature again