International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 05 Issue: 06 | June - 2021 ISSN: 2582-3930

# MOTION DETECTION AND ANALYSIS USING PYTHON OPENCV

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*Abstract* - **Object detection [9] is a well-known computer technology that focuses on finding objects or instances of a given class (such as persons, flowers, and animals) in digital photos and videos. Face detection, character identification, and vehicle calculation are just a few examples of well-researched object detection applications. Object detection has a wide range of applications, including retrieval and surveillance. Various basic ideas utilised in object detection are described in this study while using the OpenCV library of Python 2.7 to improve the efficiency and accuracy of object detection.**

***Keywords***
***Object Detection, IOU, OpenCV, Python, Matlab.***

## 1. INTRODUCTION

Video processing refers to the transformation of video frames as input into a set of associated parameters depending on the pictures in the video.
In this study, we examined various video processing approaches in order to get various parameters and achieve the desired results.
Typically, a collection of video sequences is gathered and analysed to evaluate video processing algorithms.

Object identification and localization in digital photos has become one of the most essential applications for industries looking to make life easier for their customers, save time, and achieve parallelism. Although this is not a new technology, it is still necessary to improve object detection in order to achieve the desired goal more effectively and precisely.

The fundamental goal of studying and developing computer vision is to use a computer to directly replicate the behaviour and manner of human eyes, and then design a system that lowers human labour. Computer vision is a type of research that aims to receive and represent 3D information for things in the real world. Its primary goal is to rebuild the visual features. After examining the 2D information extracted, visual properties of 3D objects are determined. 2D graphics are used to represent 3D items in real life.

Object detection analysis is the process of determining the number, location, size, and position of objects in an image.

Object detection is the fundamental notion for tracking and recognizing things, and it has an impact on object recognition efficiency and accuracy.

The color-based technique [4] is a typical object identification method that detects items based on their colour values.

The method is employed because of its versatility and robustness; however, because it involves exhaustive testing of all possible windows and has a large computing complexity, the detection speed has to be improved..

**THEORY :**

**2.1 CONCEPT:**

Each object class has unique characteristics that aid in classifying the thing. Object recognition is a sub-domain of computer vision that aids in the identification of items in a video or picture stream. Objects may now be detected even when they are partially obscured from direct view thanks to more efficient algorithms. In recent years, various approaches to this problem have been implemented.
Object detection is defined by a number of terms, including:
2.1.1 Edge matching identifies the edges using edge detection algorithms.
Count the amount of overlapping edges as the lighting and colour change.
2.1.2 Divide and Conquer is a search engine that divides and conquers.

All jobs should be viewed as a group.
The lower bound is set at the cell's optimum position.
If the bound is too large, the cell is pruned.
When a cell becomes small enough, the process comes to an end.

2.1.3 Gray scale reproduction

Edges provide a lot of information and are resistant to variations in lighting. Pixel distance is calculated as a function of pixel intensity as well as pixel position. The same logic can be used to colour.

**2.2 Create an open CV**

OpenCV (Open Source Computer Vision) is a free software library for computer vision and machine learning [10].
OpenCV was created with the goal of providing a standard infrastructure for computer vision applications and increasing the usage of machine perception in commercial products.
Because it is a BSD-licensed product, enterprises can easily use and alter the existing code in OpenCV.
Currently, the OpenCV library contains around 3000 algorithms, all of which have been efficiently optimised.
Real-time vision applications are supported.
Classic algorithms, state-of-the-art computer vision algorithms, and machine learning algorithms all fall into this category.
These methods are simple to implement in Java, MATLAB, Python, C, C++, and other programming languages, and they run on Windows, Mac OS, Linux, and Android.

**NumPy 2.3:**

NumPy is the most important Python package for scientific computing [11].

It can be seen of as a multidimensional matrices and arrays addition

to the Python programming language.
It is open source software that has a large number of contributors.
• A strong N-dimensional array object. • Broadcasting functions, among other things.

• Linear algebra, Fourier transform, and random number capabilities; tools for integrating C/C++ and FORTRAN code.

2.4 Classification of Objects
Detecting Moving Objects

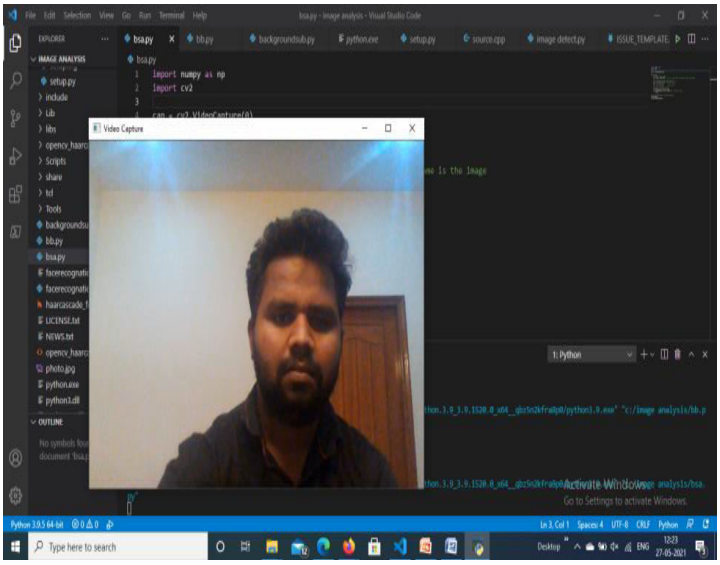
The shape, motion, colour, and texture of an object are used to classify it.
Various classifications, such as trees, animals, humans, and objects, can be used to classify items.

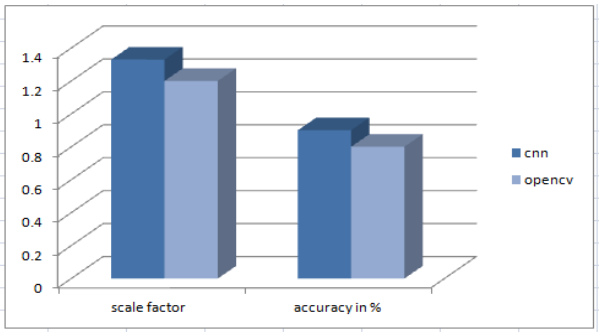
Object classification relies on the tracking of objects and the analysis of their characteristics.

**CODE :**

```
import numpy as np
import cv2

cap = cv2.VideoCapture(0)

while(True):
    # Capture frame-by-frame
    ret, frame = cap.read()  # ret = 1 if the video is captured; frame is t
he image

    # Our operations on the frame come here
    img = cv2.flip(frame,2)   # flip left-right

    img = cv2.flip(img,2)     # flip up-down

    # Display the resulting image
    cv2.imshow('Video Capture',img)
    if cv2.waitKey(1) & 0xFF == ord('q'):  # press q to quit
        break

# When everything done, release the capture
cap.release()
cv2.destroyAllWindows()
```

**3 RESULT:**






## 4. LITERATURE REVIEW

Rakibeand Patil[2]
developed a new algorithm based on the background removal approach for motion detection The first step is to utilise a statistically sound background model. After that, a threshold-based subtraction between the current image and the background image is performed. After that, a moving object is detected. Then, to reduce the noise and solve the background interruption problem, morphological filtering is used.
Kartik Umesh Sharma (2017) et al, An object identification system is proposed that discovers real-world things in a digital image or video, where the object can belong to any class of object, such as humans, cars, and so on.To detect an item in an image or video, the system requires a few components, including a model database, a feature detector, a hypothesiser, and a hypothesiser verifier.This paper provides an overview of the many strategies for detecting, localising, categorising, extracting features, appearance information, and other tasks in photos and videos.
Karanbir Chahal (2018) et al.
suggested Object detection is the process of identifying, localising, and classifying an object in an image. It is an essential component for vision-based software systems and has a wide range of applications. Image and video analysis with python opencv This work aims to conduct a thorough examination of recent deep learning-based object identification techniques. Various algorithms, quality measures, speed/size tradeoffs, and training approaches are among the subjects covered in the survey. The SSD class of single step detectors and the Faster R-CNN class of two step detectors are the two types of object detection algorithms discussed in this study.

## 5. AIM, OBJECTIVES AND SCOPE

### 5.1. ADVANTAGE:

1. Human/Object Identification
2. Minimizes the Hassle
3. Cost-effective
4. Time Save

### 5.2. APPLICATION:

**5.2.1Face Recognition:**
Have you ever wondered how Facebook recognises your face in a photo you upload?Not only can it detect the face, but it also recalls it.This is a simple item detection programme that we see in our daily lives.

**5.2.2Counting things and people:**
Object detection can also be used for counting, as it may be used to keep track of certain or all items in an image or frame.For example, it can count the number of individuals in a group photo and, if done correctly, it can also identify various people wearing different outfits.

**5.2.3Vehicle detection:**
When the object is a vehicle, object detection and tracking can be utilised to determine the type of vehicle, and this application can even be expanded to include a traffic calculator.

**5.2.4Businesses**

Object detection is also used to identify distinct products in industrial processes.If you just want your computer to recognise items of a specific shape, you can easily do so.

Hough circle detection transform [6], for example, can be used to detect circular objects.

**5.3. FUTURE SCOPE**

Computer vision is still a young field, and it hasn't yet reached the point where it can be applied to real-world situations.

After a few years, computer vision, especially object identification, will no longer be futuristic and will be commonplace.

For the time being, we can classify object detection as a sub-discipline of machine learning..

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