iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 **Issue:** VI **Month of publication:** June 2021

DOI: https://doi.org/10.22214/ijraset.2021.35880

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VI Jun 2021- Available at www.ijraset.com

Object Detection using OpenCV and Deep Learning

Balaji G V[1], Bharath Kumar[2], Nithin S[3], Pranesh D M[4], Shilpa S B[5]
[1, 2, 3, 4] *Student, Department of Computer Science and Engineering, Cambridge institute of technology, Bangalore, India*
[5] *Assistant Professor, Department of Computer Science and Engineering, Cambridge institute of technology, Bangalore, India*

Abstract: ***Object Detection using SSD (Single Shot Detector) and MobileNets are efficient because this technique detects objects quickly with less resourses without sacrificing performance. In this every class of item for which the classification algorithm has been trained generates a bounding box and an annotation describing that class of object. This provides the foundation for creating several types of analytical features such as the volume of traffic in a certain area over time or the entire population in an area is real-time detection and categorization of objects from video data.***
Keywords: Object Detection, OpenCV, SSD

I. INTRODUCTION

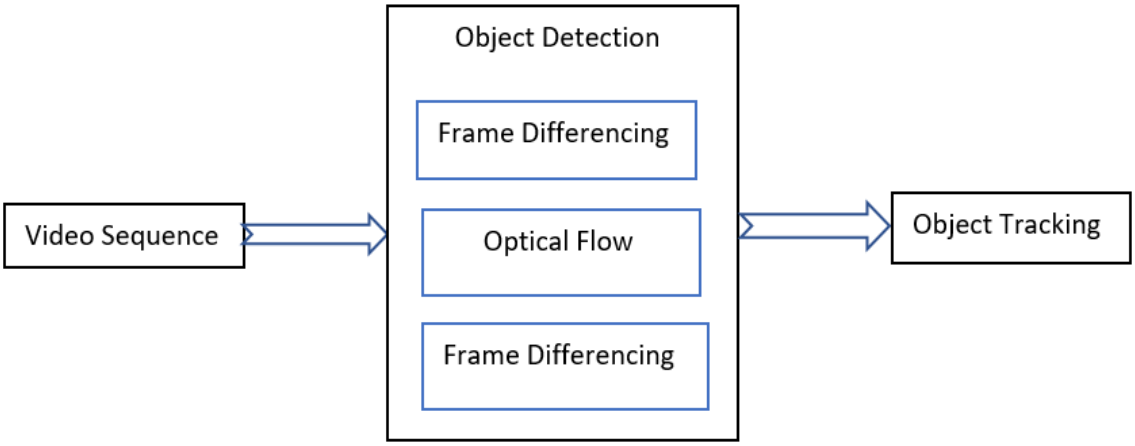


Fig. 1 Basic block diagram of detection and tracking.

Fig 1. Shows the block diagram of object detection and tracking. Object detection is a computer technology that deals with finding instances of semantic items of a specific class (such as individuals, buildings, or cars) in digital photos and videos. It is related to computer vision and image processing [1]. In this paper we worked in python environment with SSD and MobileNets as the algorithms. Different methods are –Frame differencing, Optical flow, Background subtraction. Tracking and Detecting algorithms are defined by extracting the features of video and images for security applications [2][3]. Features are extracted using CNN and deep learning [4].Section II describes the algorithms that we have used SSD and MobileNets algorithm, section III explains method of implementation which includes both object detection and object tracking, and section IV describes simulation results and analysis.

II. OBJECT DETECTION AND TRACKING ALGORITHMS

A. Single Shot Detector (SSD) Algorithm.

SSD is a popular object detection algorithm that was developed in Google Inc. [1]. It is based on the VGG-16 architecture. Hence SSD is simple and easier to implement. The core of SSD is box offsets and predicting category scores for a pre-fixed set of standard bounding boxes using minimal convolutional filters applied to feature maps . To achieve high detection accuracy, the system generates predictions at various scales from feature maps at various sizes, explicitly separating predictions by aspect ratio [5]. These design features lead to high accuracy and simple end-to-end training, even on low resolution input images, further improving the accuracy vs speed trade-off. Confidence in object detection is a measure of in which manner confidence the system is when a predicted object is compared with the actual object.

©IJRASET: All Rights are Reserved

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VI Jun 2021- Available at www.ijraset.com

B. MobileNets Algorithm.

The MobileNet model is completely based on depthwise separable convolutions that could be a variety of factorized convolutions which factorise a regular convolution into a depthwise convolution and a 1×1 convolution known as a pointwise convolution. For MobileNets the depthwise convolution applies one filter to every input channel. The pointwise convolution then applies a 1×1 convolution to mix the outputs the depthwise convolution [2]. A standard convolution both filters and combines inputs into a brand new set of outputs in one step. The depthwise separable convolution splits this into 2 layers, a separate layer for filtering and a separate layer for combining. This resolution has the impact of drastically reducing computation and model size.

III.MODES OF IMPLEMENTATION

A. Object Detection

1) *Frame Differencing*: It is detecting the difference in frames of consecutive pictures taken from the camera or the video.It is a technique for detecting motion and identifying moving and stationary objects in a visual scene..Nishu Singla [14] created a frame differencing technique, which is an algorithm that uses a fixed surveillance camera to observe motion in a visual scene and detect moving objects.The model used this technique to take an image from a stationary camera and sequence it. In their paper, Gupta et al. [6] proposed three approaches for detecting motion in a visual scene. To recognise the moving item in the video frames, background subtraction, frame difference, and self-organizing background subtraction (SOBS) are used.
2) *Optical Flow*: The pattern of apparent mobility of picture objects between two consecutive frames induced by the movement of an object or camera is referred to as optical flow. It's a two-dimensional vector field in which each vector is a displacement vector indicating the movement of points from the first to the second frame.

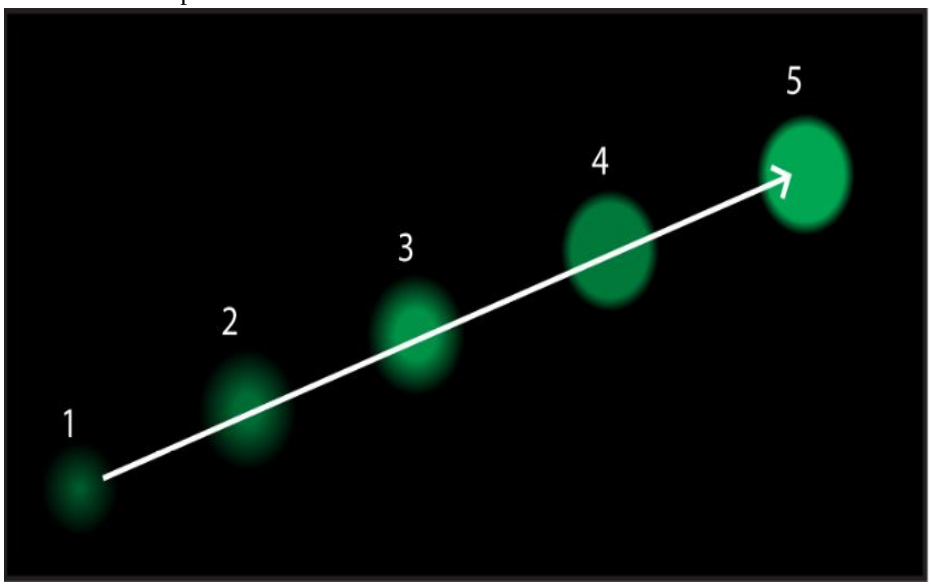


Fig. 2 Example image of Optical Flow.

3) *Optical flow is based on the following Assumptions:* (1)Between frames, the pixel intensities of an item do not vary.(2)The mobility of neighbouring pixels is similar. Optical flow estimation tries to assign to every pixel of the current frame a two-component speed vector indicating the position of identical pixel within the reference frame. There are many optical flow estimation algorithms identified within the literature. in keeping with the taxonomy planned in [7], we can cluster algorithms within the following categories: region-based matching, differential (Lucas-Kanade[5]) and energy-based algorithms
4) *Background Substraction:* Background Substraction is a frequently used approach for using static cameras to generate a foreground mask (i.e., a binary picture comprising the pixels belonging to moving objects in the scene). As the name implies, BS computes the foreground mask by subtracting the current frame from a background model that contains the static component of the picture or, more broadly, everything that may be called background given the observed scene's features[7]. The two primary stages of background modelling are Background Initialization and Background Update. An initial model of the background is computed in the first phase, and that model is updated in the second step to respond to changes in the scene.

©IJRASET: All Rights are Reserved

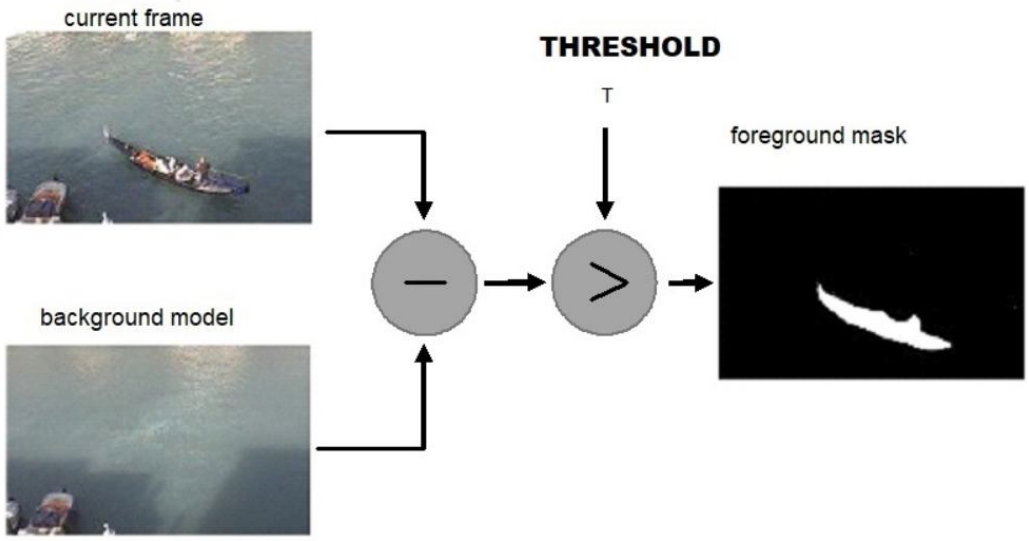


Fig. 1 Example image of Background Substraction.

The background subtraction method was able to handle variations in local illumination, such as shadows and highlights, as well as changes in globe illumination. The background model was statistically modelled on each pixel in this approach. The brightness distortion and chromaticity distortion were utilised to identify shading backdrop from regular background or moving foreground objects in computational colour mode [8].

B. Object Tracking

This technique will allow us to track the object on the screen through the bounding box. Due to changes in object velocity, object tracking is one of the most important fields of research. Feature selection, in particular, is critical in object tracking. Object identification, traffic control, human-computer interaction, gesture recognition, and video surveillance are only few of the uses. Many approaches concentrate on using a tracking algorithm to smooth the video sequence and address tracking difficulties such as object movement and appearance. In tracking for video surveillance applications, these algorithms use object shape, colour, texture, item of interest, and motion in several directions s[9].There is a improved version “detection with dynamics” which track objects based on the time [1].

IV. RESULTS

Based on a python program that was developed for the SSD algorithm and implemented in OpenCV [10]. OpenCV is run in Ubuntu IDE. The model was trained for some basic objects. The following are the outcomes that are obtained after successful object detection and tracking of object in video sequence provided by camera.



Fig. 4 Object detection of chair



Fig. 5 Object detection of bottle

©IJRASET: All Rights are Reserved

V. CONCLUSIONS

This model showed good detection and tracking results on the objects that been trained. The main objective of SSD algorithm was fullfilled with the detection and tracking. This real time object detection can help in various ways by detecting groceries for automated billing, detecting ammunition for security purpose. This model can be easily deployed in CCTVs, camera, military drones and other surveliance devices to detect objects and to track them.

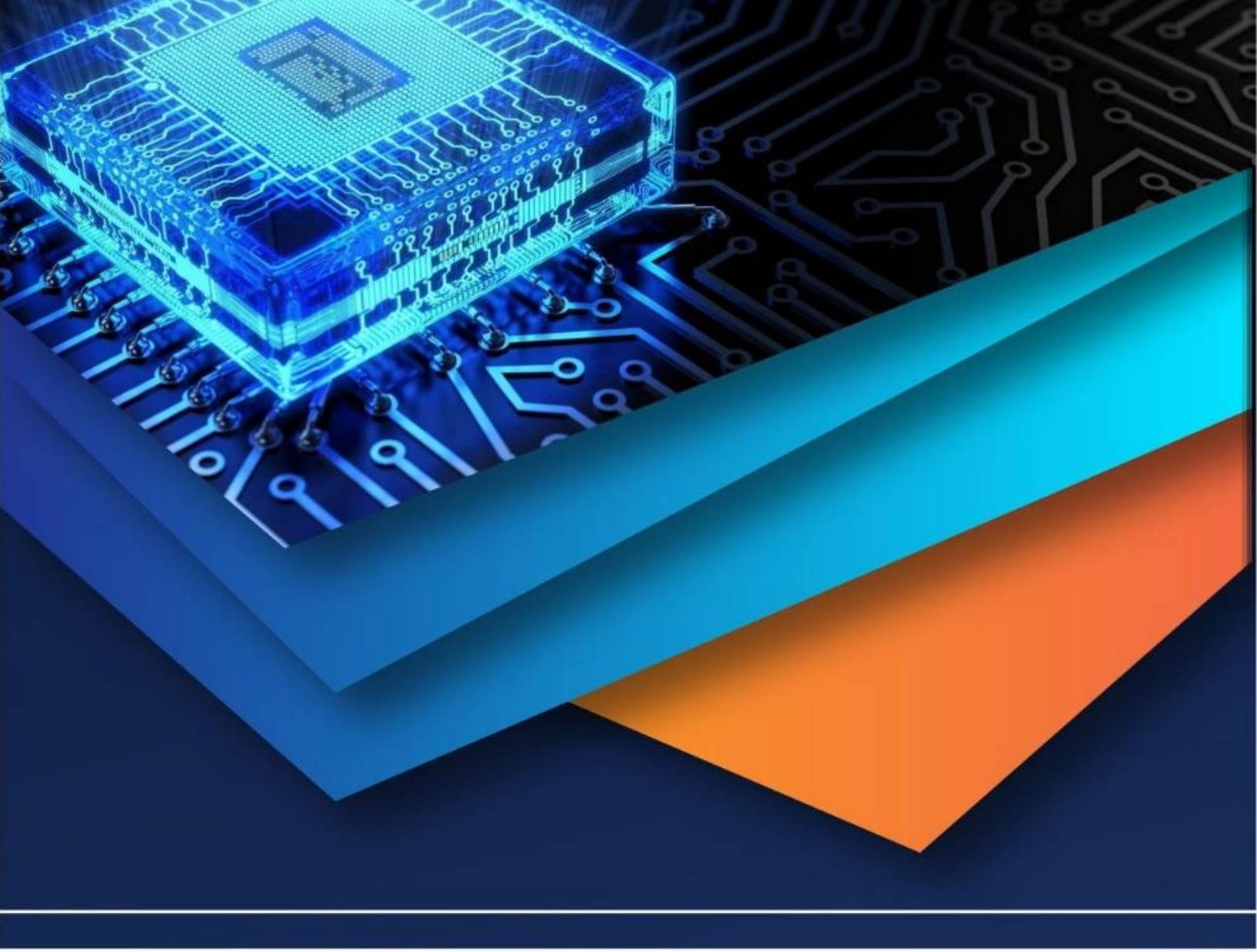
VI. ACKNOWLEDGEMENT

We wish to extend our thanks to Assistant Professor Shilpa S B, Dept. of CSE , CITech for her guidance and impressive technical suggestions to our work. Finally to all our classmates who always stood by me in difficult times also helped me in some technical aspects.

REFERENCES

[1] Chandan G, Ayush Jain, Harsh Jain, Mohana, "Real Time Object Detection and Tracking Using DeepLearning and OpenCV " 2018, india
[2] Justin Lai, Sydney Maples, "Ammunition Detection: Developing a Real Time Gun Detection Classifier", Stanford University, Feb 2017
[3] Akshay Mangawati, Mohana, Mohammed Leesan, H. V. Ravish Aradhya, "Object Tracking Algorithms for video surveillance applications" International conference on communication and signal processing (ICCSP), India, 2018, pp. 0676-0680.
[4] Manjunath Jogin, Mohana, "Feature extraction using Convolution Neural Networks (CNN) and Deep Learning" 2018 IEEE International Conference On Recent Trends In Electronics Information Communication Technology,(RTEICT) 2018, India
[5] Wei Liu and Alexander C. Berg, "SSD: Single Shot MultiBox Detector", Google Inc., Dec 2016.
[6] P. Gupta, Y. Singh, and M. Gupt, "Moving object detection using framedifference, background subtraction and sobs for video surveillanceapplication," in The Proceedings of the 3rd International ConferenceSystem Modeling and Advancement in Research Trends, 2014.
[7] https://docs.opencv.org/3.4/d1/dc5/tutorial_background_subtraction.html
[8] Mukkamala Rohith Sri Sai, Sindhusha Rella, Sainagesh Veeravalli OBJECT DETECTION AND IDENTIFICATION A Project Report 2019
[9] Mangawati, A., Mohana, Leesan, M., & Aradhya, H. V. R. (2018). Object Tracking Algorithms for Video Surveillance Applications. 2018 International Conference on Communication and Signal Processing (ICCSP). doi:10.1109/iccsp.2018.8524260
[10] Adrian Rosebrock, "Object detection with deep learning and OpenCV", pyimagesearch.

©IJRASET: All Rights are Reserved



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)