Real Time Object Detection with Deep Learning and OpenCV

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ABSTRACT :

Real time object detection is an immense, vibrant and complex area of computer vision.
Assuming there is a single object to be distinguished in an image, it is known as Image Localization and in the event that there are various objects in an image, then, at that point, it is Object Detection. Mobile networks and binary neural networks are the most generally involved techniques for current deep learning models to perform different tasks on embedded systems.
In this project, we develop a method to distinguish an item thinking about the deep learning pre-prepared model MobileNet for Single Shot Multi-Box Detector (SSD).

Keywords: object detection,
Neural Network,Deep Learning,Embedded System, Computer Vision.

1. Introduction

The trial results show that the Average Precision (AP) of the algorithm to recognize various classes as vehicle, person and chair is 99.76%, 97.76% and 71.07%, separately.

This improves the accuracy of behavior detection at a handling speed which is needed for the real-time location and the necessities of day by day observing indoor and outside. The mix of MobileNet into the SSD framework forms one of the center parts of our work.

However, MobileNet with the effective SSD framework has been a hot exploration point in recent times, to a great extent because of managing the functional limits of running strong neural nets on low-end devices like cell phones/laptops to additionally expand the horde of conceivable outcomes with respect to real-time applications.

2. Literature Review

A. MobileNet-SSD :

Our proposed model depends on the MobileNetSSD architecture. One reason why we chose this architecture is on the because that as shown in the paper [2], it gives good object detection accuracy while being quicker than different architectures, for example, YOLO.
Especially, this is valid when attempting to detect object in real time in low computing devices as in our system. MobileNet-SSD permits to lessen the detection time by addressing the model utilizing 8-bit integers rather than 32-bit floats.

The input of the model was set to an image with 300 by 300 pixels and the result of the

model addressed the position of the bounding box as well as the detection confidences (from 0 to 1) for each identified object.

B. OpenCV (Open-Source computer vision)

OpenCV is a library of programming functions basically focused on real time computer vision. OpenCV is an open-source library which is useful for computer vision applications like CCTV film analysis, video analysis and image analysis.

It is an incredible tool for image processing and performing computer vision tasks. OpenCV is written by C++ and has in excess of 2,500 optimized algorithms.

At the point when we make applications for computer vision that we do not want to make it from scratch instead we can utilize this library to begin focusing on real world problems.

OpenCV has a function to read video, which is cv2.VideoCapture(). We can access webcam by passing 0 as function parameter.
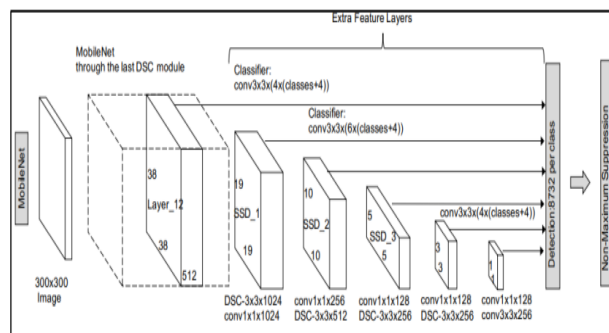
Figure 1: SSD-based detection with MobileNet as backbone.

3. Methodology

In the Proposed System, we are going to detect objects in real time with the help of Mobilenet-SSD model in fast and efficient way. We will create the Python script for object detection using deep neural network with OpenCV 3.4.

First, Input will be given through Realtime video by camera or webcam, based on streamlined MobileNet Architecture which uses depth-wise separable convolutions to build light weight deep neural Networks.

The input video divided into frames and pass it to MobileNet layers.

Each feature value is determined as a difference between the amount of pixel intensity under the bright region and the pixel intensity under the dark area.

Every one of the possible sizes and area of the image is utilized to compute these elements.

An image may contain irrelevant features and few relevant characteristics that can be used to detect the object.

The job of the MobileNet layers is to change over the pixels from the input image into highlights that describe the contents of the image.

Then it passes to MobileNet-SSD model to determine the bounding boxes and corresponding class(label) of objects.

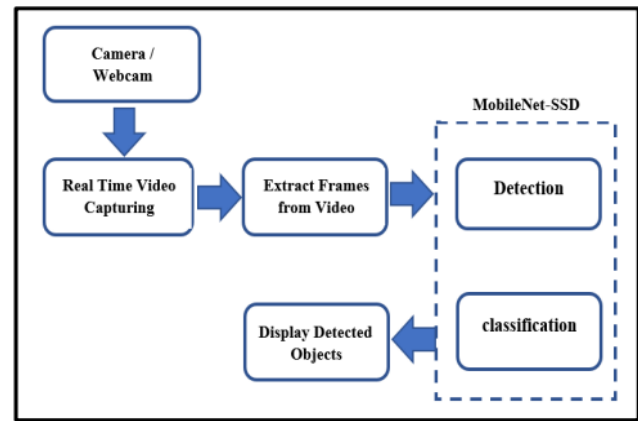After that the only last step is to show or display the Output.

Figure 2: Proposed System Architecture Diagram

4.Future Work

Self-Driving Cars:

Advanced management systems interpret sensory info to spot acceptable navigation methods, similarly as obstacles and once the image sensing element detects any sign of a living being in its path, it mechanically stops. This happens at a awfully quick rate and could be a massive step towards Driverless Cars.
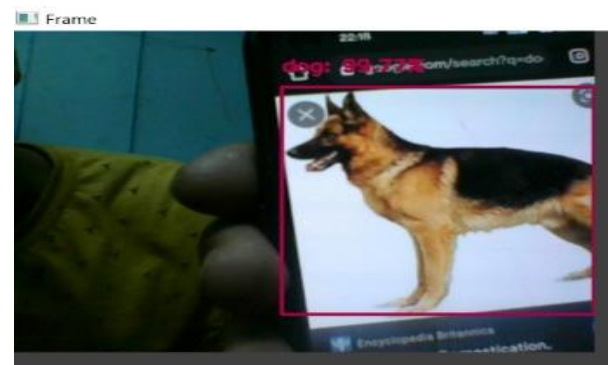
Working Screenshots:

Image : 1.1

Security :

Object Detection plays a awfully vital role in Security. It is conjointly employed by the government to access the protection feed and

match it with their existing information to search out any criminals or to observe the robbers' vehicle.

Industrial Quality Check:

Object detection is additionally utilized in industrial processes to spot product.

Finding a particular object through visual review may be a basic task that's concerned in multiple industrial processes like sorting, inventory management, machining, quality management, packaging etc.

Inventory management is terribly difficult as things area unit arduous to trace in real time. Automatic object tally and localization permits rising inventory accuracy.

Conclusion :

In this project, we proposed a deep learning model to identify progressively the place of the object in pictures.

The framework could distinguish the item with a normal accuracy like other best in class frameworks.

In this way, we utilize an object detection module that can recognize what is in the real time video stream.

To carry out the module, we join the MobileNet and the SSD framework for a quick and productive deep learning-based strategy for object detection.

In future work, we will keep on enhancing our detection network model, including lessening memory utilization and speeding up and additionally we will add more classes.

Image :1.2

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