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IOT based urban surveillance using RaspberryPi and Deep learning with Mobile-Net Pre-trained model

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Abstract

The object detection is required to have a stronger protection in the surveillance areas. some of the surveillance systems uses cc cameras to monitor the area .It needs someone to check the output in particular area with-out rest. It is a difficult process for people who have to secure distant areas like fields , homes ,roads, restricted areas which cannot be monitored continuously by a person. object detection using raspberry pi and deep learning with pre-trained model can able to secure the place even without the person. It continuously monitors the area and identifies if any unwanted presence is detected and immediately sends an alert message to the respective device. The setup is fed with a lot of sample images like person, dog ,cat etc .The system checks the unwanted object to the sample images using mobile-net single shot detection by determining the accuracy of common features .Thus it helps to detect the unwanted presence with more accuracy than the previous existing systems.

KEYWORDS: (LINUX O.S, DEEP LEARNING,PYTHON-OPENCV,MOBILE-NETS,RASPBERRYPI)

1. INTRODUCTION

Object detection has the capability of locating and identifying objects in the real time processing With the recent advances in deep learning and open cv , computer scan form large image datasets which can able to learn, recognize and track objects seen in images and videos with great accuracy. This thesis studies the possibility of implementing an object detector on a single board computer, the Raspberry Pi B+, capable of maintaining real-time frame rate while keeping high precision. The computing power is not satisfactory in some of the object detecting systems. So, This object detecting method is selected for evaluating the detection accuracy measurement, inference time and throughput.

2. EXISTING SYSTEM

In the previous surveillance systems [1]-[5], object recognition is performed by image-processing algorithms like R-CNN,RGB-D models .Images are provided as input. Matlab is used which causes more GUI with windows. The main elements of the output like speed, accuracy should be improved for further classifications.

3. PROPOSED SYSTEM

Automated object detection algorithm is majorly used in urban surveillance systems based on Internet of Things (IoT) and smart cities applications. This object recognition is used in detecting unwanted presence, if any unwanted presence is detected then an alert SMS and mail with corresponding image frame will be sent .Linux Operating System is used to make a real time Object recognition system with a two dimensional input, where it will detect the object and display real time object according to the atmosphere and surrounding. Python-OpenCV programming is used for implementing this process with Deep Learning concepts. In object recognition using deep learning.

The methods like Single Shot Detectors and Mobile-Nets are used. When these are combined together super-fast, real-time object recognition on resource constrained devices is obtained. The input is

given through the i.p web camera and the output bounding box (x, y)-coordinates of each object in the image is obtained. In Mobile Nets, Efficient (deep) Neural Network combining with Single shot Detector makes it more efficient and faster. This will make a real time project to detect the object where a box will be made and how much accuracy of that object will be displayed as the object moves the box will also moves according to the actions made to the object by humans.

4. SOFTWARE

I. Mobilenet SSD

Single shot object detection takes one single shot to detect multiple objects within the image it composes of applying convolution filter to detect objects it is developed by Google research institute maintained the balance between the two object detection methods which are yolo and RCNN. SSD is faster than RCNN because in a CNN,we need two shots one for generating region proposals and one for detecting objects whereas SSD it can be done in a single shot.This will allow us to pass input through the network and obtain the output bounding box and x,y coordinates of each object in the image.

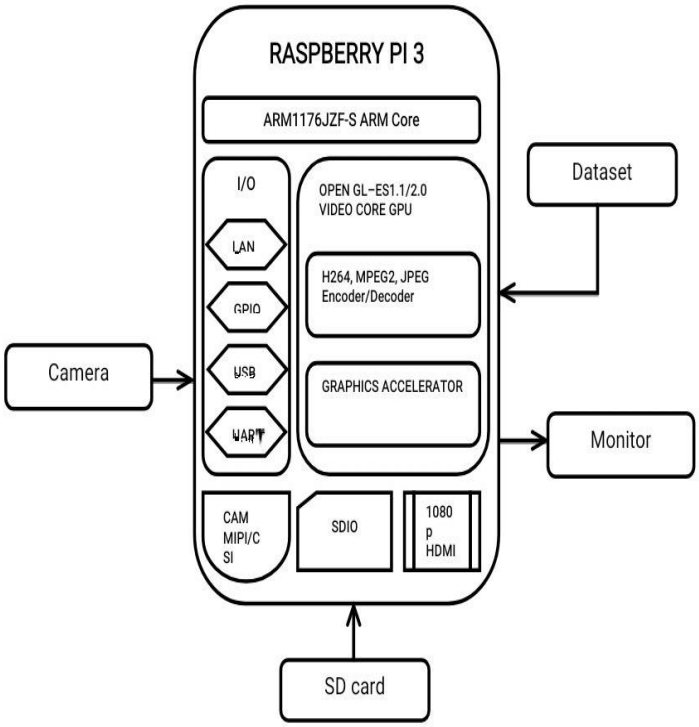

Fig 1. Proposed surveillance model

II. Python opencv

Python opencv is an interpreted high level programming language for programming in the system. It was multiple options for developing gui. Python standard library commonly cited as one of the greatest strength provides to suited for many tasks in object detection. The main reason for using python is because of its simplicity and code readability.

III. Linux

When comparing Linux and windows as operating systems, one of the major reason for selecting Linux is ,it is an open source project and fully visible to the public. There are several distributions ported to raspberry Pi, among them raspbian weezy is one of the distribution.

IV. Raspbianweezy

Raspbianweezy is one of the fastest ways to set up and get the raspi running deep learning

is an AI function and a machine learning subset that do the workings of the human brain in processing data for use in decision making.

V. Raspberrypi:

Raspberry Pi is a single board computer it is based on Broadcom soc (system of chip) with an ARM processor, yah GPU and 256 to 512 MB Ram. SD card is used in the raspberry Pi for persisting data.

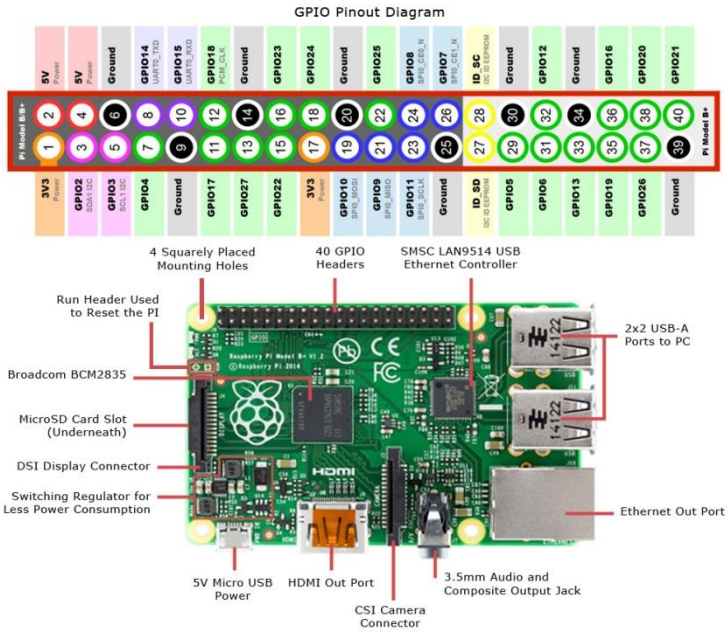

Fig 2. RaspberryPi kit

5. PROPOSED SYSTEM METHODOLOGY

1. Raspbianos software is downloaded in to the microsd card which performs the actions needed in the process.
2. The microSD card (16gb) is kept in raspberry Pi and booted up such that the raspbianos operates in the raspberry pi.
3. To operate the raspberrypi through laptop, v.n.c viewer application is used.
4. Mobile Net SSD_deploy.caffemodel and pretrained model is installed in the raspberrypi.
5. The python opencv code is programmed to detect the objects and determine the accuracy with an alert message.
6. Ip webcam is connected to the system to deliver the input.
7. A mobile device is linked to the set-up for alert messaging.

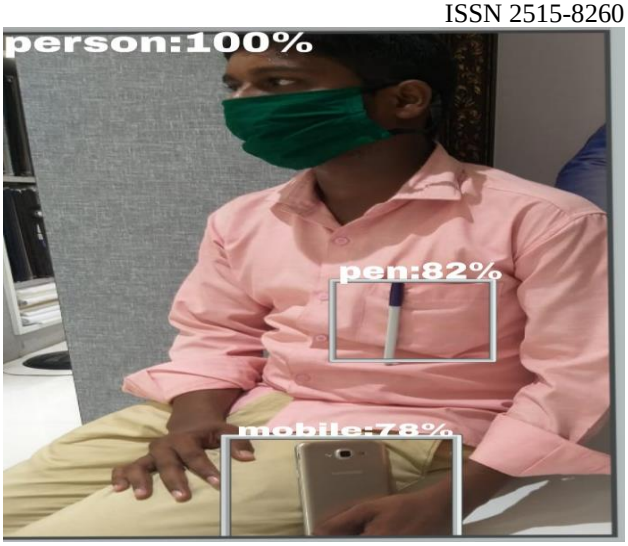

Fig 3. Sample image 1

Fig 4. Sample image 2

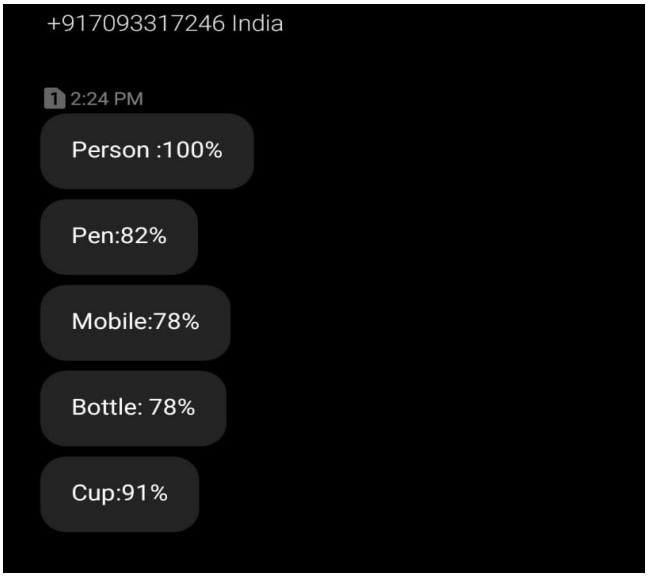

Fig 5. Alert messaging through SMS

6. CONCLUSION

This work can be extended to provide more security in any private organizations, roads, restricted areas, fields by using this technology. We can have a continuous monitor on unexpected entries and have an uninterrupted surveillance in particular areas.

7. REFERENCES

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