Object Detection using Raspberry Pi

Shailesh Sachan
Information Technology Engineering, Saraswati College of Engineering, Kharghar, Mumbai University, India

Abstract: Object Detection and following are essential and testing undertakings in numerous PC vision applications, for example reconnaissance,self driven cars, vehicle route, self-sufficient robots and various security purposes. Object Detection includes finding objects in the casing of the video succession. For instance measure of a planet in astronomy, distinguishing diseases in mammography scan in medicine, controlling into an obstacle in robotics, identifying persons eye shade or hair color in security. The goal is to construct a model that can recognize and indicate the shading that make utilization of open source materials and catches visual information caught from an ordinary camera(webcams, Picams, etc).On a live video at first the class of object is detected and tracks the length by creating a four sided polygon (square or a rectangle) around the object. I have executed it through OpenCV on Linux foundation.

***Keywords*: Video Capturing, Raspberry Pi, Python, OpenCV, TensorFlow, Protocol buffer.**

1. INTRODUCTION

- Object Detection gives you the ability to detect objects present in live stream. The programming is done in python in such a way that the Picam or a USB webcam can be used for live feeding of video. The trained model can detect fruits, and python code count the count of fruits present on a tree or anywhere. Object detection helps in distinguishing colours and size too. This can predict the ripeness and growth of a particular fruit. This camera detection can calculate the fruits growth and distinguish each fruits present in a bunch in which fruits are all mixed together. The commitments of this paper are to ease the process and save time in gardens or orchards in calculating and distinguishing the fruits and keep a count on the growth. The commitment of this paper are to show a portable mechanism of detection and calculation of fruits and count on the growth respectively. This model gives an overview of raspberry pi 3B+ with
- SoC: Broadcom BCM2837B0 quad-core A53 (ARMv8) 64-bit @ 1.4GHz
- GPU: Broadcom Videocore-IV
- RAM: 1GB LPDDR2 SDRAM
- Networking: Gigabit Ethernet (via USB channel), 2.4GHz and 5GHz 802.11b/g/n/ac Wi-Fi
- Bluetooth: Bluetooth 4.2, Bluetooth Low Energy (BLE)
- Storage: Micro-SD
- GPIO: 40-pin GPIO header, populated
- Ports: HDMI, 3.5mm analogue audio-video jack, 4x USB 2.0, Ethernet, Camera Serial Interface (CSI), Display Serial Interface (DSI)
- Dimensions: 82mm x 56mm x 19.5mm, 50g

2. RELATED WORK.

There has been a lot of work in object detection using traditional computer vision techniques. Cameras and Devices with processors with very high speed are used that use technologies like CNN,ANN, etc . Object Detection is being used in every field of work like optical character recognition, Self Driving Cars, Tracing Objects, Face Detection, Object extraction, activity recognition and many more things. However the devices with small processors like the Raspberry Pi cannot give that much speed because of low processor and less memory but than to it can be used for various surveillance and other applications like the one explained below .

3. RELATED LITERATURE REVIEW.

In 1996 a paper with title “Color Image Processing and Object Tracking System” with an aim to achieve automation by integrating the discrete components into a cohesive system. In 2013 and 2012 papers in security domain with title “Real time Object Detection and Tracking System “ and “Mobile Robot for Object Detection Using Image Processing “ which proposed to detect moving objects using

rotating camera and a Mobile Robot for surveillance as the sensors are stationary. In 2014 a paper titled "Object Detection and tracking using image processing" which proposed to mainly focus on object detection tracking based on its color.

4. METHODOLOGY.

This block diagram gives the steps to be followed for complete execution image detection.

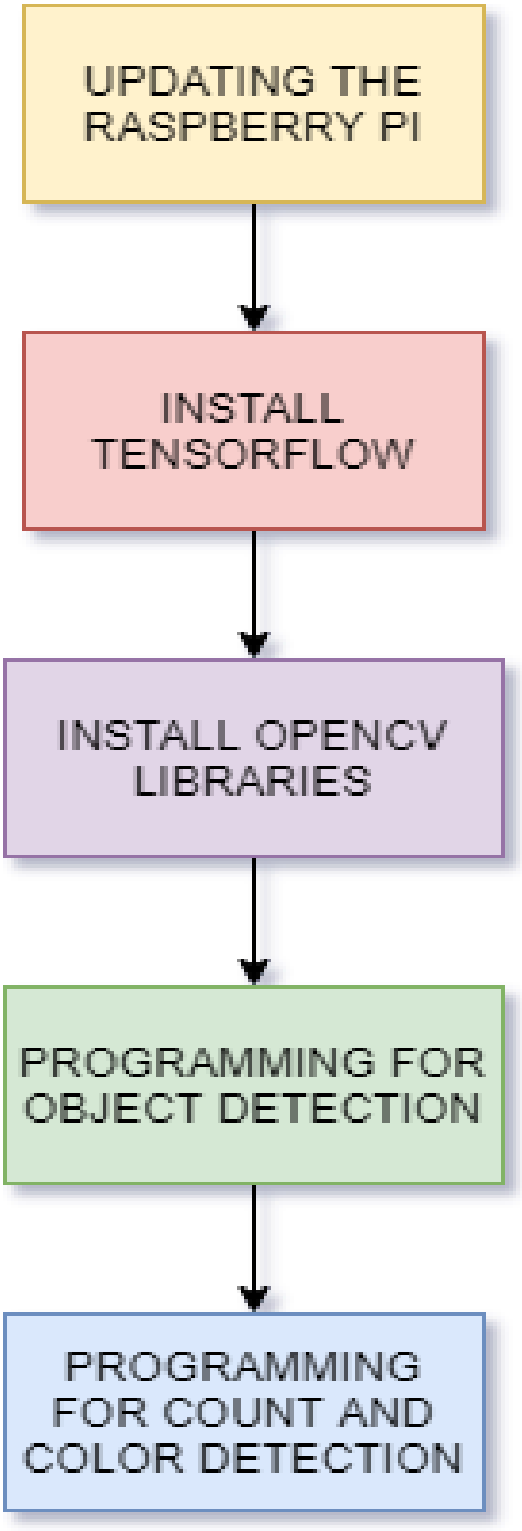


Fig. 2. Block Diagram of methodology

A. Updating the Raspberry Pi

In this phase the raspberry pi is installed and updated with Raspbian OS based on Linux. The Raspberry pi should always be updated to latest to avoid errors .The OS comes with inbuilt Python IDE but some extra libraries are needed to be installed .

B. Install Tensorflow

In this phase Tensorflow libraries are installed in the Raspberry Pi. This is a very important dependency required as Tensorflow's Object Detection API is a powerful tool which enables everyone to create their own powerful Image Classifiers. No coding or programming knowledge is needed to use Tensorflow's Object Detection API.

C. Intsall OpenCV libraries

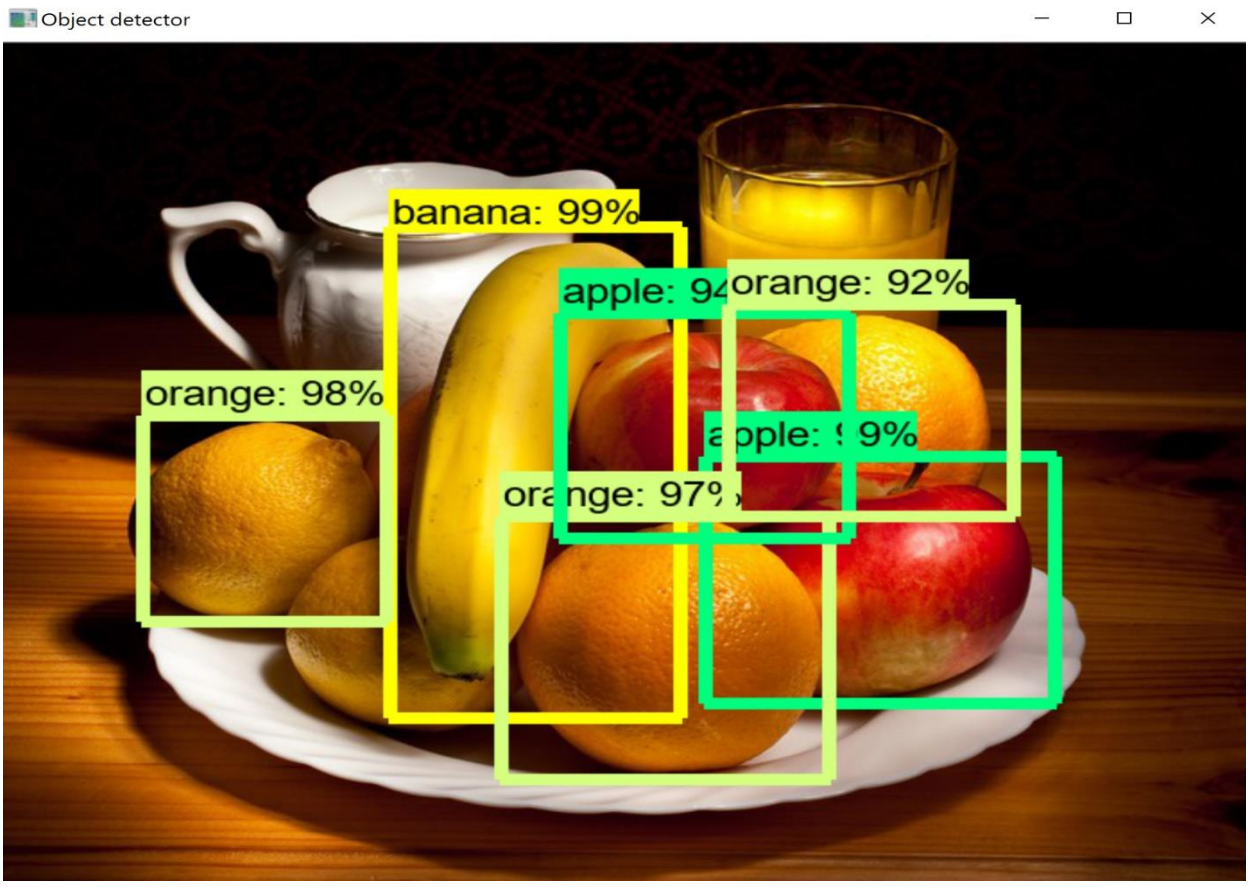
In this phase OpenCV is installed as OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications. It is a very powerful tool needed for object detection. Next important dependency is to install protocol buffer.

D. Programming for Object Detection.

In this phase Python program we write a program for Object Detection using Tensorflow and OpenCV libraries and I have used a pre-trained model from the SSD_Lite model from the Tensorflow model zoo. The model zoo is Google's collection of pre-trained object detection models that have various levels of speed and accuracy.

E. Programming for Count and Color Detection

In this phase in the Python program color detection and counter coding is done and hence Result is shown with the final count of the fruits.



5. CONCLUSION

The system implemented will therefore give a count of the fruits , can distinguish the status of the fruit if it is ripe or not based on it color. It will become easy to differentiate fruits also. The count data can be used to predict if growth has increased or decreased also the profit and loss gained can be calculated by the owner himself. In this manner this can be useful in gardens and orchards and save their time in counting and differentiating their fruits.

References

[1] Vijayalaxmi, K.Anjali, B.Srujana, P.Rohith Kumar "OBJECT DETECTION AND TRACKING USING IMAGE PROCESSING" **Global Journal of Advanced Engineering Technologies,ISSN (Online): 2277-6370 & ISSN (Print): 2394-0921-2014.**

[2] Himanshu Borse, Amol Dumbare, Rohit Gaikwad & Nikhil Lende "Mobile Robot for Object Detection Using Image Processing" **Global Journal of Computer Science and Technology Neural & Artificial Intelligence, Online ISSN: 0975-4172 & Print ISSN: 0975-4350.**

[3] Prof.V.B.Raskar1, Nilesh Hargude2, Sabale Vishwanath3, krishna Chavan4 "*PRACTICAL APPLICATIONS OF ROBOTIC HAND USING IMAGE PROCESSING*" ***International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 4 Issue 3, March 2015.***

[4]Mrs.R.Hemalatha1,Mrs.E.Deepa2and Mrs.R.Sasipriya3 "Automated Driving Vehicle Using Digital Image Processing**" IJISET** - **International Journal of Innovative Science, Engineering & Technology, Vol. 2 Issue 9, September 2015, ISSN 2348 – 7968.**

[5] Prof. D. S. Pipalia, Ravi D. Simaria "
Real Time Object Detection & Tracking System (locally and remotely) with Rotating Camera", **International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321-8169 Volume: 3 Issue: 5 3058 – 3063.**

[6] LalehMakarem, Denis Gillet, "Information sharing among autonomous vehicles crossing an Intersection",**IEEE International Conference on Systems, Man, and Cybernetics, October 14-17, 2012.**

[7] S. Yuan, H. Lau, D.K. Liu, S.D. Huang, G. Dissana yake, D. Pagac, T. Pratley, Simultaneous DynamicScheduling and Collision-Free Path Planning for Multiple Autonomous Vehicles, IEEEInternational Conference on Information and Automation June 22 -25, 2009.