REAL TIME OBJECT DETECTION

CSE 4027 DATA ANALYTICS

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Done By

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Project Link:

https://github.com/Rohith710/Real-Time-Object-Detection

Abstract:

Object detection plays an important role in computer vision, automatic vehicles, industrial automation etc. Detecting objects in real time is a challenging task. Deep learning in object detection is better than traditional target detection. Deep learning methods include Region proposal object detection algorithms wherein it generates region proposal networks and then classify them. These include SPP-net, Region-based Convolutional Neural Networks, Fast-RCNN, Faster-RCNN etc. This project summarizes the various real time object detection using Computer Vision.

Required Libraries

1)OpenCV

2)Numpy

OpenCV library which is used and utilized in the fields of robotics,computer Vision,etc.OpenCV has a bunch of pre-trained classifiers that can be used to identify objects such as trees, number plates, faces, eyes, etc. We can use any of these classifiers to detect the object as per our need.

DATASETS AND WEIGHTS:

1) Common Objects in Context (COCO),which is a database that aims to enable future research for object detection, instance segmentation, image captioning, and person keypoints localization

***This dataset Contains 91 common object names**

2) ssd_mobilenet_v3_large_coco_2020_01_14.pbtxt: Which is a Config File for Trained MobileNet SSD Model(many versions are also available).

3) Weights - frozen_inference_graph.pb - derived from tensor flow

an open source artificial intelligence library, using data flow graphs to build models. It allows developers to create large-scale neural networks with many layers

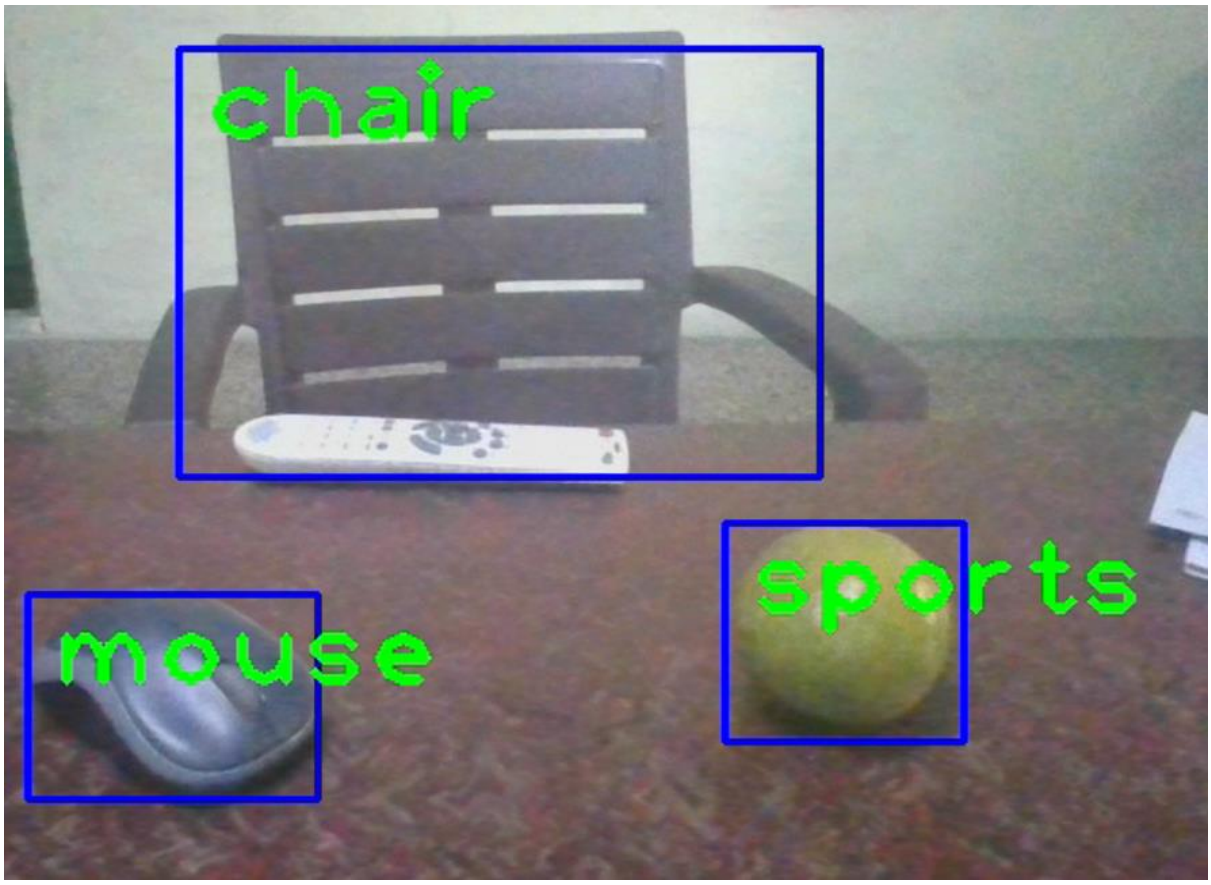
Challenges in Existing System:

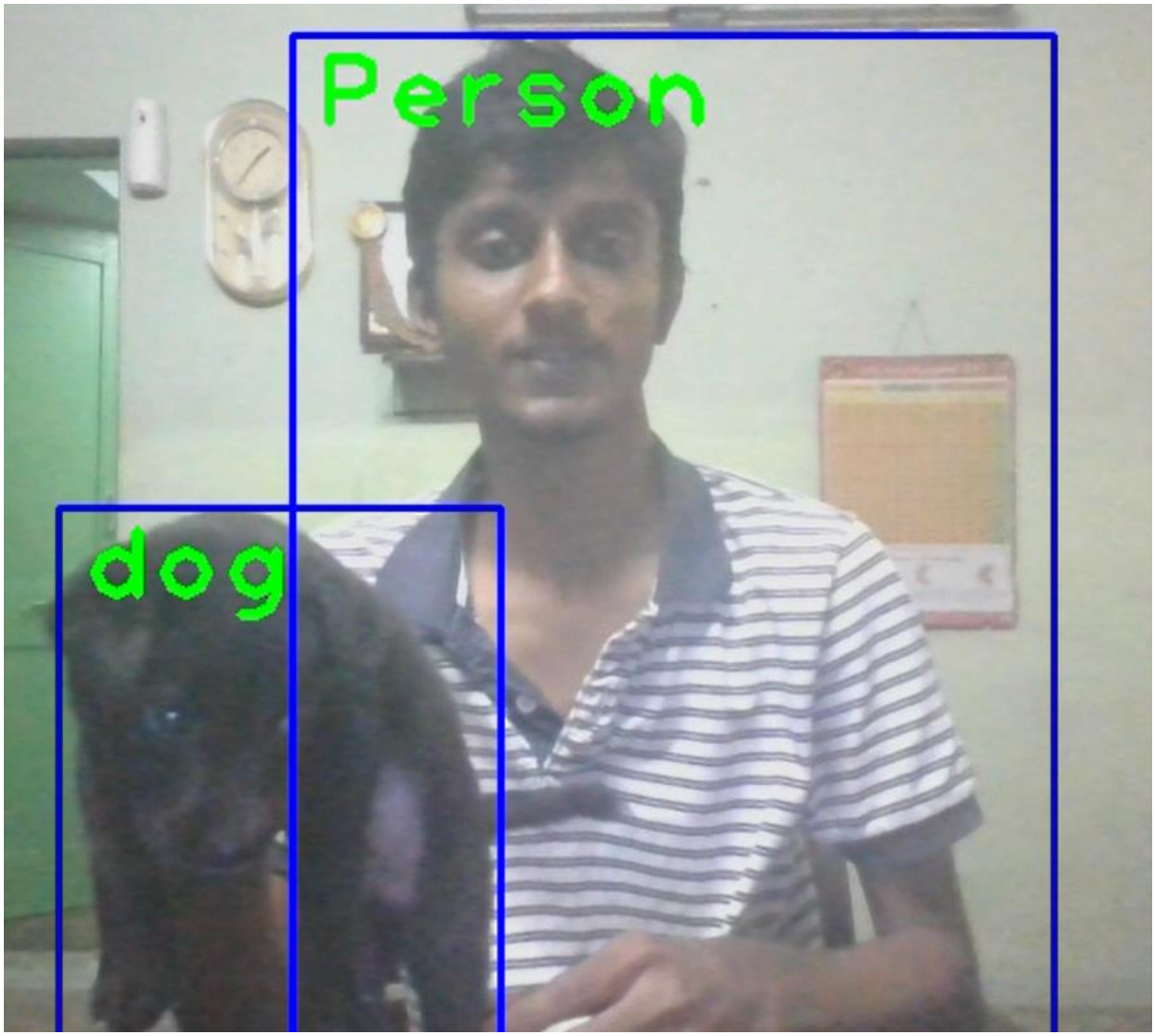
Real time object detection is used in various real world problems and has many applications, such as Face Mask Detection, Face Camera detection ,and even it is used in many traffic sites to detect the type of vehicles and numberplates many more. This one uses various Machine Learning algorithms.YOLO is one of the famous (You Only Look Once) is **a real-time object detection algorithm that identifies specific objects in videos, live feeds, or images**. YOLO uses features learned by a deep convolutional neural network to detect an object.

Proposed Methodology:

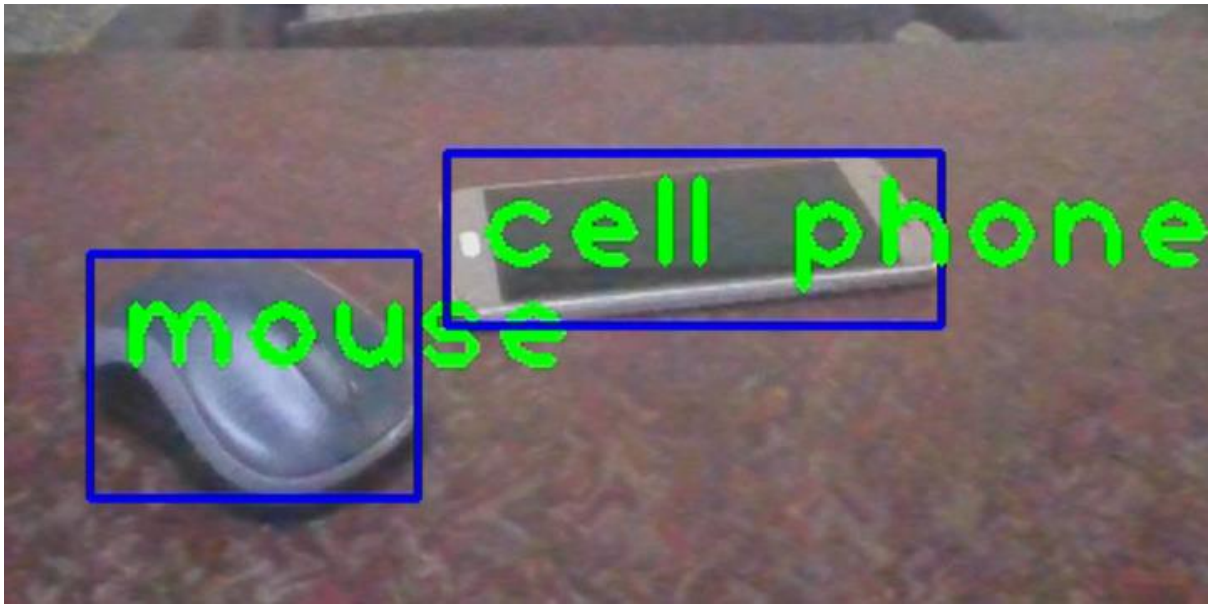
Even though YOLO and TensorFlow gives more accuracy and approximation or predictions, these two were not utilized in this project. As only experts and professionals who are well diverse in Deep Learning ,Machine Learning and Computer Vision can be able to use YOLO and TensorFlow, whereas, this project only uses computer Vision ,which can be easily learn and understand by beginner's.

Sample Outputs:




Person
dog


remote


cell phone
mouse


laptop


keyboard

LITERATURE REVIEW:

As this project had been done by few researchers and different methodology has been used by them. In this paper , we are going to use a different methodology and dataset.

Below tables represents the methodology used by the researchers.

Year	Author	Title & Architecture	Domain & Problem Statement	Conclusion & Result
2016	Joseph Redmon, Santosh Divvala, Ross Girshick, Ali Farhadi	You Only Look Once: Unified, Real-Time Object Detection	A fast and simple approach to detecting real time images was introduced in this paper as You Only Look Once. The model was built to detect images accurately, fast and to differentiate between art and real images.	In comparison with Object detection techniques that came before YOLO, like R-CNN, YOLO introduced a single unified architecture for regression go image into bounding boxes and finding class probabilities for each box. This meant that YOLO performed much faster and also provided more accuracy. It could also predict artwork correctly

2018	Chengji Liu, Yufan Tao, Jiawei Liang, Kai Li1, Yihang Chen	Object Detection Based on YOLO Network	A generalized object detection network was developed by applying complex degradation processes on training sets like noise, blurring, rotating and cropping of images. The model was trained with the degraded training sets which resulted in better generalizing ability and higher robustness.	The experiment showed that the model trained with the standard sets does not have good generalization ability for the degraded images and has poor robustness. Then the model was trained using degraded images which resulted in improved average precision. It was proved that the average precision for degraded images was better in general degenerative model compared to the standard model
2018	Wenbo Lan, Jianwu Dang, Yang-ping Wang, Song Wang	Pedestrian Detection Based on YOLO Network Model	The network structure of YOLO algorithm is improved and a new network structure YOLO-R was proposed to increase the ability of the network to extract the information of the shallow pedestrian features by adding passthrough layers to the original YOLO network.	The YOLO v2 and YOLO-R network models were tested on the test set of the INRIA data set. The experimental results show that the YOLO-R network model is superior to the original YOLO v2 network model. The number of detection frames reached 25 frames/s, basically meeting the requirement of real-time performance.
2018	Rumin Zhang, Yifeng Yang	An Algorithm for Obstacle Detection based on YOLO and Light Filed Camer	An obstacle detection algorithm in the indoor environment is proposed which combines the YOLO object detection algorithm and the light field camera and will classify objects into categories and mark them in the image.	The images of the common obstacles were labeled and used for training YOLO. The object filter is applied to remove the unconcern obstacle. Different types of scene, including pedestrian, chairs, books and so on, are demonstrated to

				prove the effectiveness of this obstacle detection algorithm
2019	Zhimin Mo1, Liding Chen1, Wen-jing You	Identification and Detection of Automotive Door Panel Solder Joints based on YOLO	A method for identifying the solder joints of automotive door panels based on YOLO algorithm that provides the type and location of solder joints in real time. For detecting the small solder joints more precisely, this paper adopts YOLO algorithm which adopts multi-level predictions, predicting on different size feature maps and combining the prediction results to obtain the final result.	The YOLO algorithm, proposed identifies the position of the solder joints accurately in real time. This is helpful to increase the efficiency of the production line and it has a great significance for the flexibility and real-time of the welding of automobile door panels

References:

[1] Joseph Redmon,Santosh Divvala,Ross Girshick,Ali Farhadi. ”You Only Look Once: Unified, Real-Time Object Detection” [J].2016 IEEE Conference on Computer Vision and Pattern Recognition (CVPR),2016:779788.

[2] Chengji Liu ,Yufan Tao ,Jiawei Liang ,Kai Li1 ,Yihang Chen, ”Object Detection Based on YOLO Network” 2018 IEEE 4th Information Technology and Mechatronics Engineering Conference (ITOEC 2018)

[3] Wenbo Lan, Jianwu Dang, Yangping Wang and Song Wang, ”Pedestrian Detection Based on YOLO Network Model” 978-1-5386-60751/18/$31.00 ©2018 IEEE

[4] Rumin Zhang, Yifeng Yang, ”An Algorithm for Obstacle Detection based on YOLO and Light Filed Camera”, 2018 Twelfth International Conference on Sensing Technology (ICST)

[5] Zhimin Mo1, Liding Chen1, Wenjing You1 ”Identification and Detection of Automotive Door Panel Solder Joints based on YOLO” 978-1-72810106-4/19$31.00 ©2019 IEEE

[6] M. Everingham, S. M. A. Eslami, L. Van Gool, C. K. I. Williams, J. Winn, and A. Zisserman. The pascal visual object classes challenge: A retrospective. International Journal of Computer Vision, 111(1):98–136, Jan. 2015.

[7] Software Architecture in Practice, 3rd Addison-Wesley Professional ©2012, ISBN:0321815734 9780321815736

[8] Joseph Redmond, Ali Farhadi, ”YOLOv3: An Incremental Improvement”, University of Washington

[9] Shotton, J., Blake, A. and Cipolla, R. (2008) ‘Multi scale categorical object recognition using contour fragments’, IEEE Transactions of Pattern Analysis and Machine Intelligence, Vol. 30 No. 7, pp.1270–1281.

[10] Peralta, B., Espinace, P. and Soto, A. (2012) 'Adaptive hierarchical contexts for object recognition with conditional mixture of trees', Proceedings British Machine Vision Conference, pp.121.1–121.11

[11] Russell, B.C., Torralba, A., Liu, C., Fergus, R. and Freeman, W.T. (2007) 'Object recognition by scene alignment', Proceedings on Advances in Neural Information Processing Systems.

[12] Triesch, J. and Eckes, C. (2005) 'Object recognition with deformable feature graphs: faces, hands, and cluttered scenes', Handbook of Pattern Recognition and Computer Vision, pp.461–480, doi: 10.1142/9789812775320_0025.

[13] Verbeek, J. and Triggs, B. (2007) 'Scene segmentation with conditional random fields learned from partially labeled images', Proceedings of Advances in Neural Information Processing Systems.

[14] Yanulevskaya, V., Uijlings, J. and Geusebroek, J.M. (2013) 'Salient object detection: from pixels to segments', Image and Vision Computing, Vol. 31, No. 1, pp.31–42.