Project Objectives

YOLOv3 object detection:

YOLOv3 (You Only Look Once, Version 3) is **a real-time object detection algorithm that identifies specific objects in videos, live feeds, or images**. The YOLO machine learning algorithm uses features learned by a deep convolution neural network to detect an object.**YOLOv3 is the most recent variation of the You Only Look Once (YOLO) approaches**. This family of models is popular for real-time object detection which in 2015 was introduced in the paper "You Only Look Once: Unified, Real-Time Object Detection" by Joseph Redmon et al.
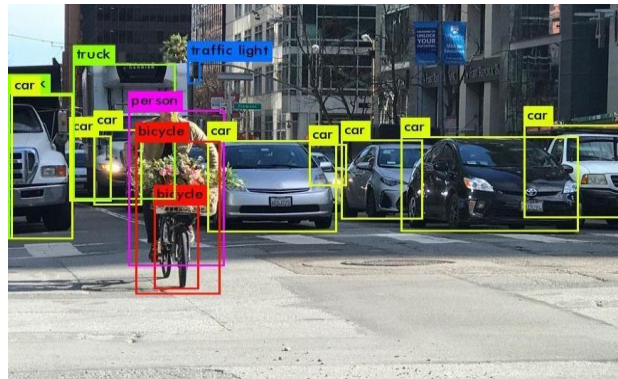

Fig:Real Time Object Detection

YOLO-based CNN family of models for object detection:

As a key use of image processing, object detection has boomed along with the unprecedented advancement of Convolutional Neural Network (CNN) and its variants since 2012. When CNN series develops to Faster Region with CNN (R-CNN), the Mean Average Precision (mAP) has reached 76.4, whereas, the Frame Per Second (FPS) of Faster R-CNN remains 5 to 18 which is far slower than the real- time effect. Thus, the most urgent requirement of object detection improvement is to accelerate the speed. Based on the general introduction to the background and the core solution CNN, this paper exhibits one of the best CNN representatives You Only Look Once (YOLO), which breaks through the CNN family's tradition and innovates a complete new way of solving the object detection with most simple and high efficient way. Its fastest speed has achieved the exciting unparalleled result with FPS 155, and its mAP can also reach up to 78.6, both of which have surpassed the performance of Faster R-CNN greatly. Additionally, compared with the latest most advanced solution, YOLOv2 achieves an excellent tradeoff between speed and accuracy as well as an object detector with strong generalization ability to represent the whole image.

versions of YOLO

In the past years, scholars have published several YOLO subsequent versions described as **YOLO V2, YOLO V3, YOLO V4, and YOLO V5** [3-10]. There are a few revised-limited versions, such as YOLO-LITE [11-12]. This research paper only focused on the five main YOLO versions.

How to train a YOLO model in a windows environment:

○ Create *yolov3* and *training* folders on your Desktop
○ Open a command prompt and navigate to the "**yolov3**" folder

- Create and copy the **darknet.exe** file

- Create & copy the files we need for training (i.e. "**obj**" dataset, "**yolov3-custom.cfg**", "**obj.data**", "**obj.names**" and "**process.py**") to your *yolov3* dir

- Copy the "**yolov3-custom.cfg**", "**obj.data**", "**obj.names**", and "**process.py**" files and the **"obj"** folder from the *yolov3* directory to the *darknet* directory

- Run the **process.py** python script to create the **train.txt** & **test.txt** files

- Download the pre-trained **YOLOv3** weights

- Train the detector

- Check performance

- Test your custom Object Detector