3D Object Detection for Autonomous Vehicles

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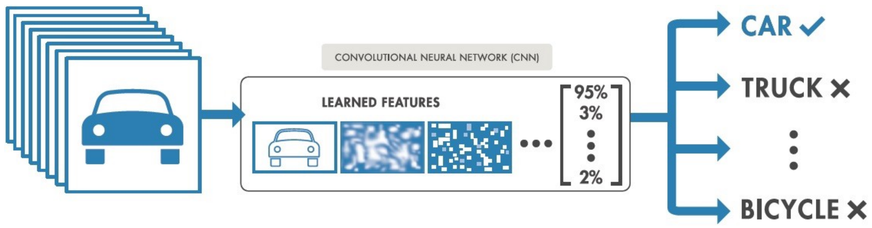
Introduction

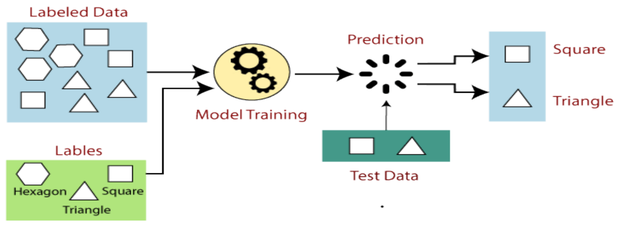
- Self-driving cars use machine learning for computer vision systems that make decisions after object classification (creation of semantic maps)



- Lyft Dataset contains categorized training data from a dash camera which can train a machine learning model, similar to KITTI/Nuscenes dataset.

OpenCV

- OpenCV is a library of functions aimed at real-time computer vision(CV)-including morphology and edge detection for distance and shape

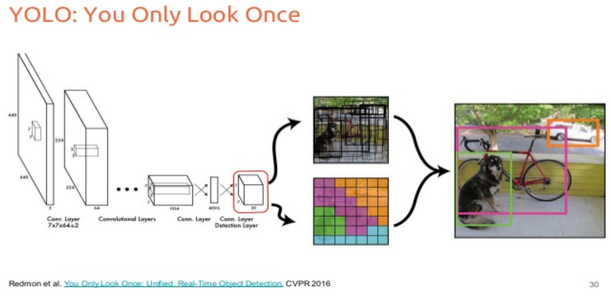


OpenCV

YOLO Implementation

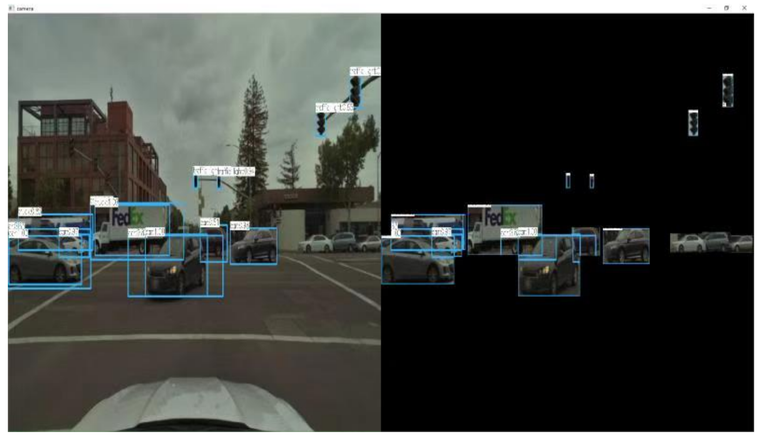
- YOLO (you only look once) is an FCN (fully convolutional network), designed for quick real-time object detection

- A single trained neural network (DarkNet) predicts bounding boxes and class probabilities for objects directly from images in one evaluation using NMS,IOU.

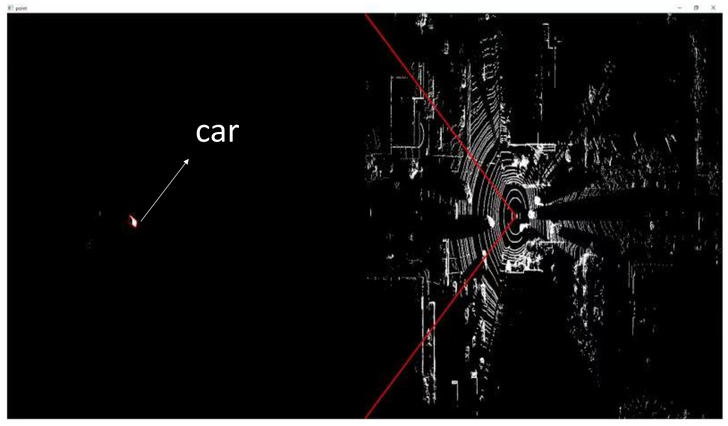


Results

- YOLO output is a feature map



- Converted optical images and point cloud images into the same coordinate system
- LIDAR maps are also analyzed and combined with YOLO result for 3D result.



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Link to competition

kaggle