# 3D object detection for autonomous vehicles

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Project overview

- Lyft is developing self-driving cars- using machine learning to give cars ability to classify objects on the road, and make decisions based on 3D object detection and semantic maps
- Classify objects in images from car dashboard camera sensor-
- Detection level of image classification- location + semantic tag

System Architecture
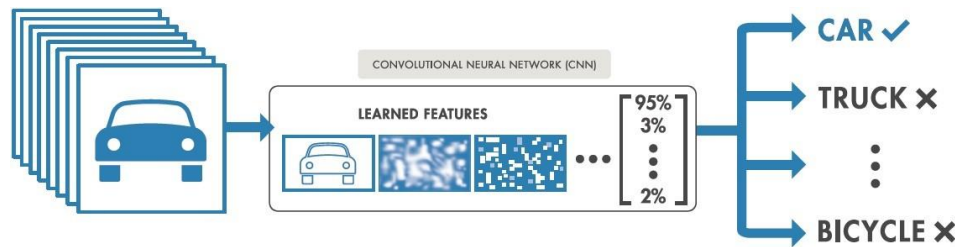
1. Data collection from Hardware- Camera sensor

Training data consists of multi-object images from a car camera, already classified & labelled. LIDAR + area maps also include

2. KITTI Vision benchmark data format for 3D object detection

Industry standard for autonomous vehicles- nearly all existing code that was developed by the research community uses KITTI format

3. Lyft Dataset SDK for data visualization

Based on the original nuScenes SDK for their open-source dataset for autonomous vehicles
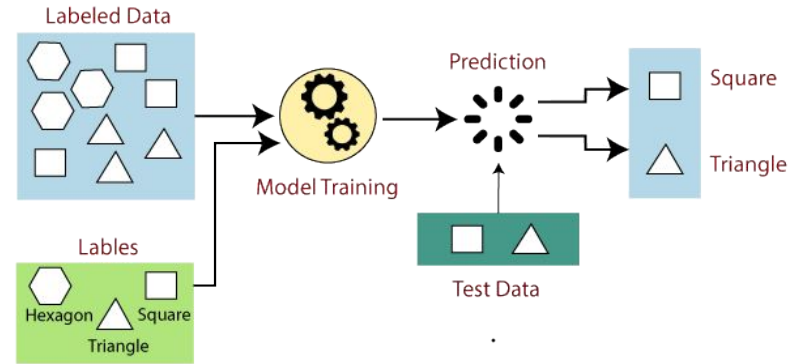
4. YOLO (You only Look once) implementation for IOU & classification

Fast real time multi object detection algorithm, obtained from OpenCV

5. Train convoluted neural network to calculate IOU & label testing data set

Use DarkNet: neural network framework that is open source
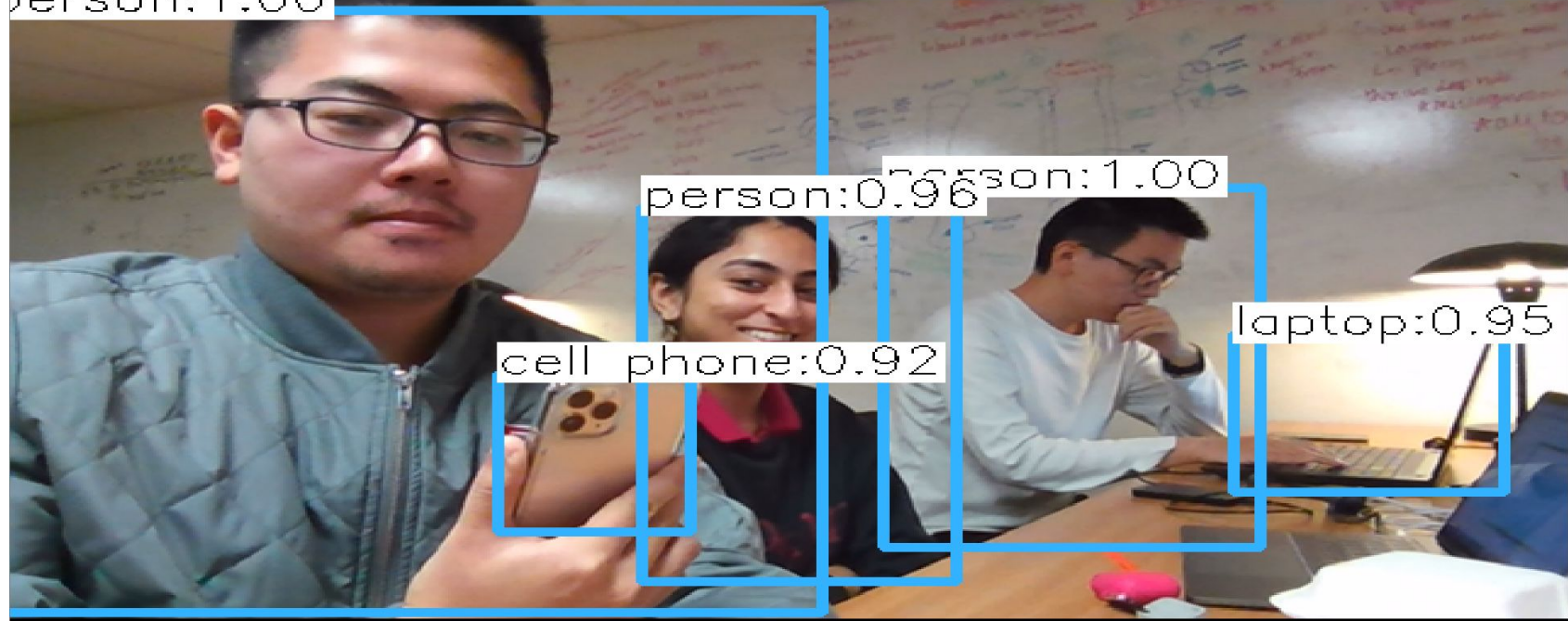
Components

- SDK library
- YOLO: An implementation of a neural network using darknet framework
- KITTI
- Load Data
- 2D to 3D objects
- Use specific data for specific algorithms
- Identify 3D objects + mark them
- Obtain 3D bounding volume- compare to ground truth bounding volume
- Classify Objects

Demo

Optional Next Steps

- See if 2-stage CNN is better than YOLO implementation

- See if Single Shot Multibox Detector is needed

- Declare confidence level of classification

- See if any alternative machine learning techniques (other than CNN) may be better

Thank You