License Plate Detection in Complex Scenes

Authors:
Yuan Wang(yuangw866@stanford.edu)
Kaiyu Zhao(kaiyuz@stanford.edu)

Presentation Link: https://drive.google.com/open?id=13Gg-aiM4BQ54AgIBKQ1cOg1c16VJ78qe

Introduction

- License plate detection is a popular application for neural network object detection algorithms. In this project, we investigated fine-tuning with YOLO-V3 as baseline model and tried several strategies to improve its ability to detect small license plates & avoid false positives:
  (1) Increase input image resolution;
  (2) Re-tune anchors;
  (3) Train on images with & without license plates;
  (4) Train together with other seven object classes.

Data

- We used Open-Image dataset which contains images with multiple (0 or more) license plates that appears as part of complex scenes.
- We created 2 pairs of train & validation datasets by restricting to (1) images with license plates and (2) image with & without license plates.

# of Images	Train	Validation
Images w/ LP	5,368	2,065
Images w/ & w/o LP	35,368	24,153

Models

- The baseline model is YOLO-V3.
- Uses 9 anchor boxes based on COCO.
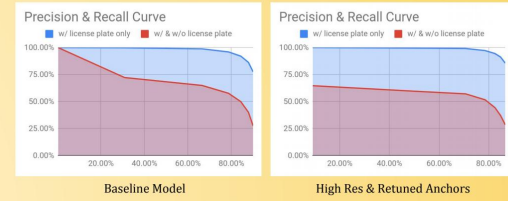- Initialized with COCO weights & train on our dataset
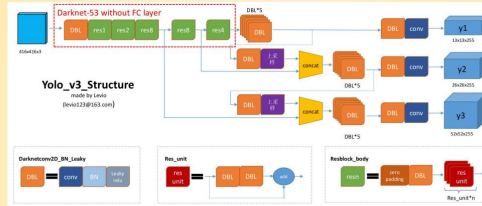
Results

- The mAP on validation images with LP and validation image with & without LP improved significantly.

mAP	Image with LP	Image with & without LP
YOLO V3 (Baseline)	85.85%	51.40%
YOLO V3 High Res	87.74%	54.46%
YOLO V3 High Res & Re-tuned Anchors	88.39%	61.47%
YOLO V3 Trained on Image with & without LP	87.17%	57.57%

- High Res & Retuned Anchors has best mAP
- Precision Recall significantly better than baseline

Baseline Model

High Res & Retuned Anchors

- The image prediction results for different models.

Baseline Model   High Res & Retuned Anchors   With & Without License Plate

- False positive decreased.

Baseline Model   High Res & Retuned Anchors