Abstract

This project is to implement an objection detection function which is deployed on dash cameras of vehicles. We apply Yolov3 as our object detection algorithm, since it is capable to achieve real-time image processing and outperforms other object detection algorithms (e.g., SSD, Fast-RCNN) in processing speed and accuracy.

Yolov3 Summary

There are 252 layers in Yolov3 in total, including 75 Conv2D layers, 72 Batch Normalization layers, 72 Leaky ReLU activation layers, 23 Add layers, 5 2D Zero Padding layers, 2 Concatenate layers, 2 2D Up-sampling layers, and a very last Input layer. Yolov3 usually combine some layers as a unit. A Cov2D usually is followed by a BatchNormalization layer with a LeakyReLU layer behind. These three layers form a Darknet_Conv2D (DBL) unit. A Residual (Res) unit consist of 2 DBL units and an Add layer which adds the DBL output and the input of Res unit together. In addition, Yolov3 designs Resn units, which stack a Zero Padding layer and a DBL unit with n numbers of Res units together.

```
[convolutional]
batch_normalize=1
size=3
stride=1
pad=1
filters=512
activation=leaky
```

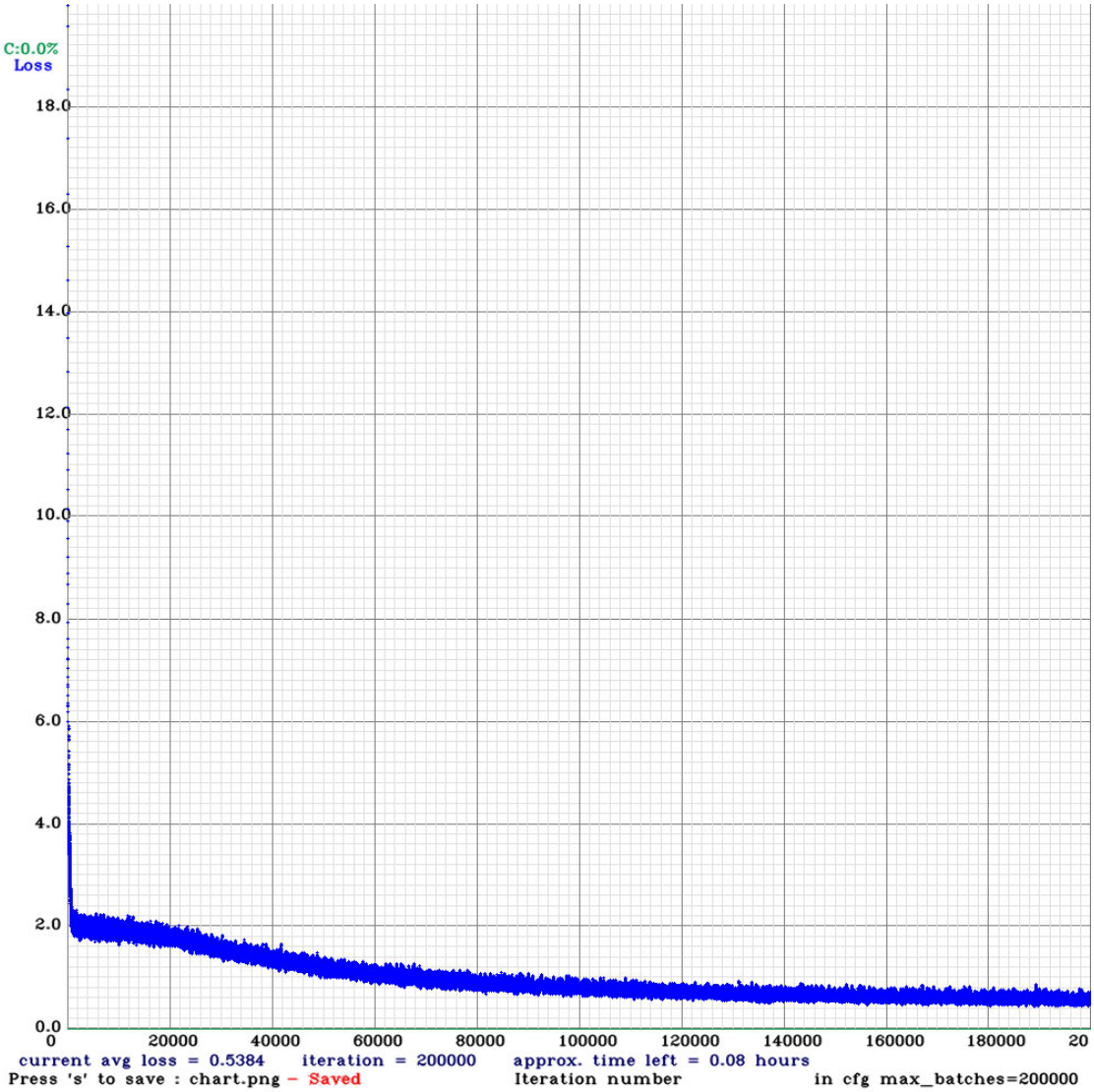
Figure 1. DBL unit

```
[convolutional]
batch_normalize=1
filters=64
size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=128
size=3
stride=1
pad=1
activation=leaky

[shortcut]
from=-3
activation=linear
```

Figure 2. Res Unit

Result

The first training result:



Latex citation:

```
@article{yolov3,
    title={YOLOv3: An Incremental Improvement},
    author={Redmon, Joseph and Farhadi, Ali},
    journal = {arXiv},
    year={2018}
}
```