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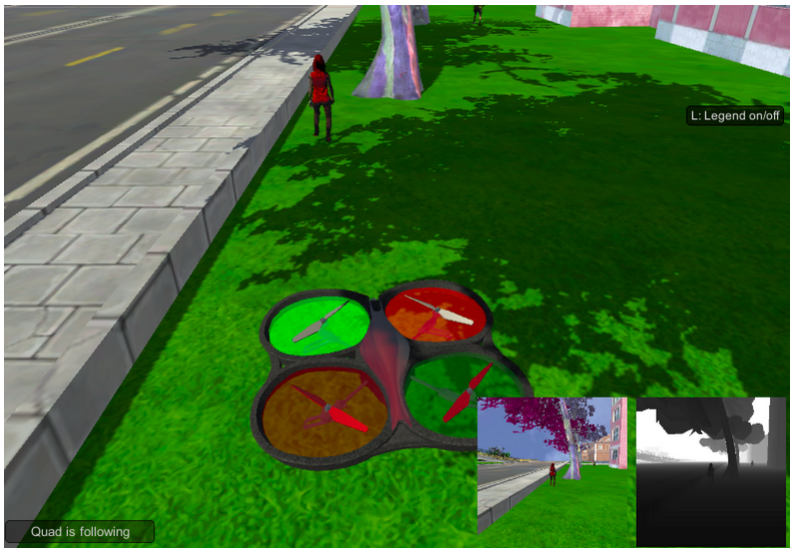
Self Driving Car – Robotics Engineer
Report Follow Me Project

Introduction

This project uses a fully convolutional neural network to let a drone segment a target in an image and follow it in a virtual environment. This aproach allows to paint every single pixel in an image depending on the label of the object it contains and in order to measure the performance of the model is used IOU (intersection over union) which takes the intersection of the prediction pixels and ground trurh pixels and devides it by the union of them.



Data Collection

I used the data provided by Udacity.

Network Architecture
The network can be devided into the following stages:

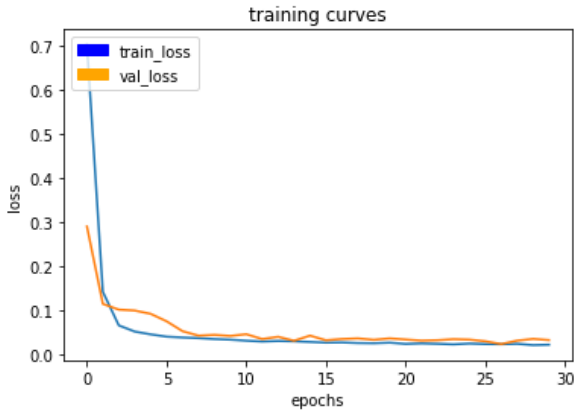
- Input image.
- Firs encoder layer, which extracts characteristics useful to perform segmentation in the future.
- Second encoder layer.
- 1x1 Convolution layer, this is an alternative of a fully connected with the advantage that preserves spatial information.
- First decoder layer, that up scale the encoder output back into the dimensions of the original image.
- Second decoder layer.
- Convolution output with softmax activation function to perform segmentation.

Trainin Process
Unfortunatly I run out of AWS credits so I had to perform the training using my pc, after a very long period of time I could succesfully train the neural network with 30 epochs in aproximatly 20 hours.

Experiments and Results

Since the computational resources are so high for fully convolutional neural networks I only did only one implementation, the metric showed a performance above 0.4 and that was very satisfying. The performance in simulation following the target was so satisfying.

```
100/100 [==============================] - 2139s - loss: 0.0210 - val_loss: 0.0351
Epoch 30/30
 99/100 [============================>.] - ETA: 18s - loss: 0.0219
```




```
100/100 [==============================] - 2158s - loss: 0.0219 - val_loss: 0.0325
Out[9]: <tensorflow.contrib.keras.python.keras.callbacks.History at 0x7fb1277e2d30>
```