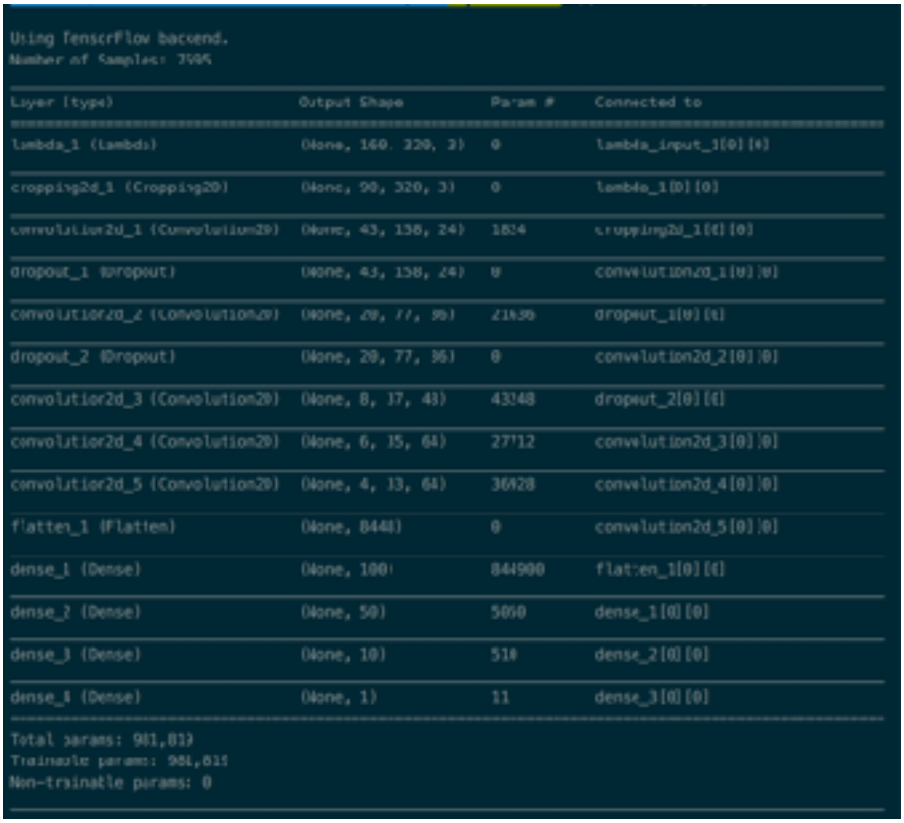
Project 3: Behavioral Cloning
Lakshay Khatter

The behavioral cloning project was an attempt of having a self driving car drive by itself. By using computer vision and deep learning we now know it is possible to take existing architectures and data augmentation techniques to build a model that will allow a car to drive around a track once it has been trained for that track. While our car can drive by itself it cannot drive around any track that it has not been trained on. This paper will discuss the implementation strategy behind having a car running autonomously around a track.

The first step in having a self driving car is to collect training data (an image and an angle associated with it). Using the Udacity Self driving car simulator I recorded a few laps of consistent driving around the track. While this may seem ideal, It did not lead to results when testing. The car would run off the track on sharp turns and thus required recording laps on how to manage recovery. Another set of techniques used were to invert the images along with there angles (by multiplying a negative). Another set of images came from left and right cameras from the car. The angles from these were used alongside a correction factor to help better adjust.

After a few laps of driving was recorded, the next steps was to build the model and test how it performs. The model architecture looks as below, it is an adaptation based on the NVIDIA end to end model.



One of the problems that I ran into while training this model was the fact that it kept overfitting the training set. So In order to avoid this I added two dropout layers and increased the number of epochs. So on average the training loss vs the validation loss, the training loss was always higher. This meant that the model was performing well on the validation set, or data it has not seen yet.

Overall this project was very realistic in terms of a deep learning computer vision project. The idea of collecting training data, wrangling it, augmenting it and running it though a network was a very interesting experience and one that has been impactful. There's just not many project where you can experience the "pain" of a deep learning project.