Suchet Sapre
Period: 3
1/16/19

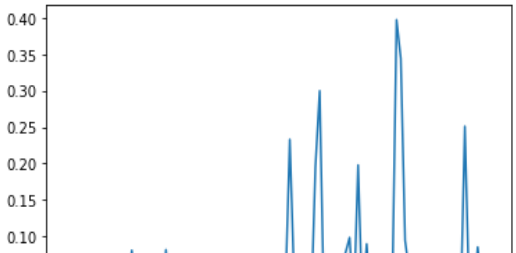
Journal 15

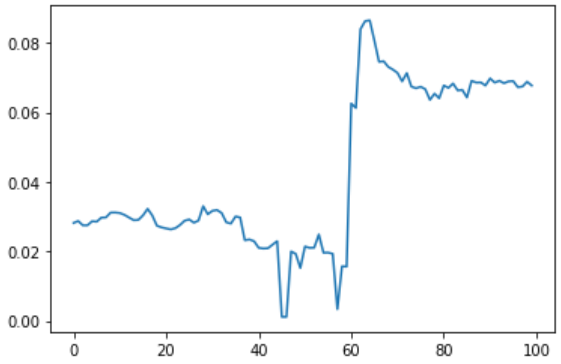
Throughout this past week, I began implementing my Machine Learning (ML)-based vehicle crash predictor. The main change that I have made from my outline in Journal 14 was the structure of my training labels (y-train data). Namely, in the one-dimensional binary vector whose size is the number of frames in a given video, I only labeled the frame indices from 20 frames before the crash to the crash itself as 1's (with the rest as 0's). I did this because my project is focused on being able to predict vehicle crashes, so if I labeled the frame indices after the crash with 1's, it would ultimately serve to confuse my algorithm.

As a baseline, I trained my algorithm on 6 dashcam videos containing a crash and 6 that don't contain a crash. The output of my algorithm is a real number between 0 and 1 representing the predicted probability that a crash will occur within the next 20 frames. Depicted below are two of the videos that I tested my classifier on. The graphs represent the aforementioned predicted probability across all 100 frames of the dashcam video. Below each of the graphs are two images, the left image represents the frame at which my classifier had its first major increase in predicted probability and the right image represents the frame in which the crash occurs. From the first video's results, it's evident that my classifier had its first spike in predicted probability at frame 55 which is a correct prediction 28 frames into the future. In the second video, although the overall probability scale is fairly low (the maximum probability reached in any of the 100 frames is only ~0.08), there is still a noticeable spike at frame 61. This means that the classifier was able to predict the vehicle crash 15 frames into the future.

Although I have promising results from this initial ML implementation, there are still many improvements that need to be made before I can obtain comprehensive results. The goals that I have for the near future are training my model on more videos and feeding in more information about each frame (i.e., vehicle positions or velocities) to ensure that it has all the information necessary to make a reliable prediction.

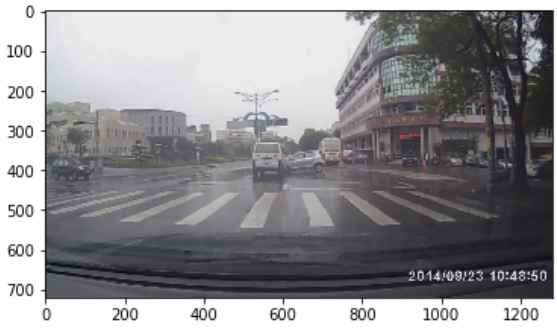
**The results are on the next page*





Predicted Crash

Predicted Crash at
Frame 61



Crash at
Frame 76