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Udacity- Self Driving Car Course
Term 1

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Vehicles Detection

In this project we aim to detect vehicles on the road. We train, on a first part, a classifier that recognised car from non pictures. We use in a second part the window sliding technique to find cars on our road images. We optimise our classification using heat maps and averaging results over the video stream.

Car Classifier

We start by training a classifier to classify the car from non car images using a the vehicle dataset. On a first part we extract features from our images before fitting the data using the SVC classifier. We get the best results using the YCrCb color space. We extract the hog, hist and space features and concatenate their results.
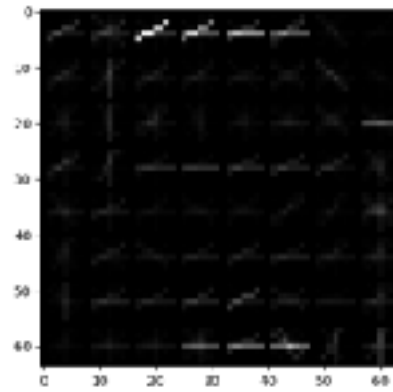
[Car Hog image from the Y channel]
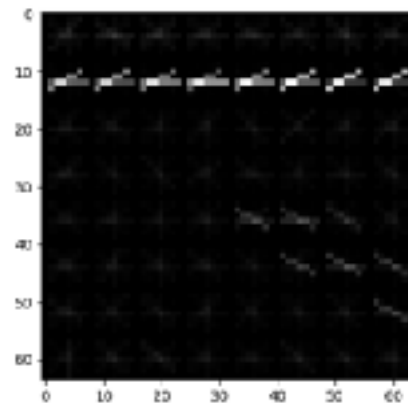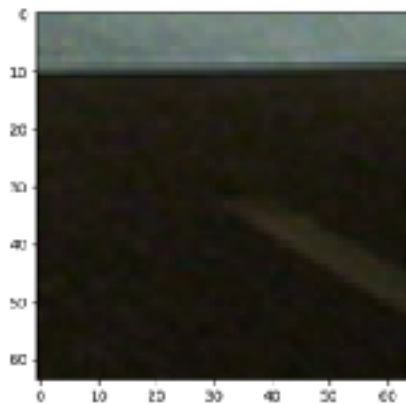
[Non Car Hog image from the Y channel]

We get.a test accuracy of 0.989. We serialise our classifier using Pickle.

```
41.21 Seconds to train SVC...
Test Accuracy of SVC =  0.9913
```

Vehicle Detection

Once we trained our classifier, it's time to start our vehicle detection.

Window Sliding

We use the window sliding technique to detect the cars. We slide windows with different sizes and apply our classifier to check whether or now the window contain a car. To gain in performance, we apply hog transform on the entire image first. Once we got the boxes that contain the cars, we create a heat map and use a threshold to remove the false positive. Then we extract the boxes back from the heat map using label from scipy. To improve performance and reduce false positive, we collect the boxes from the last 10 frames.
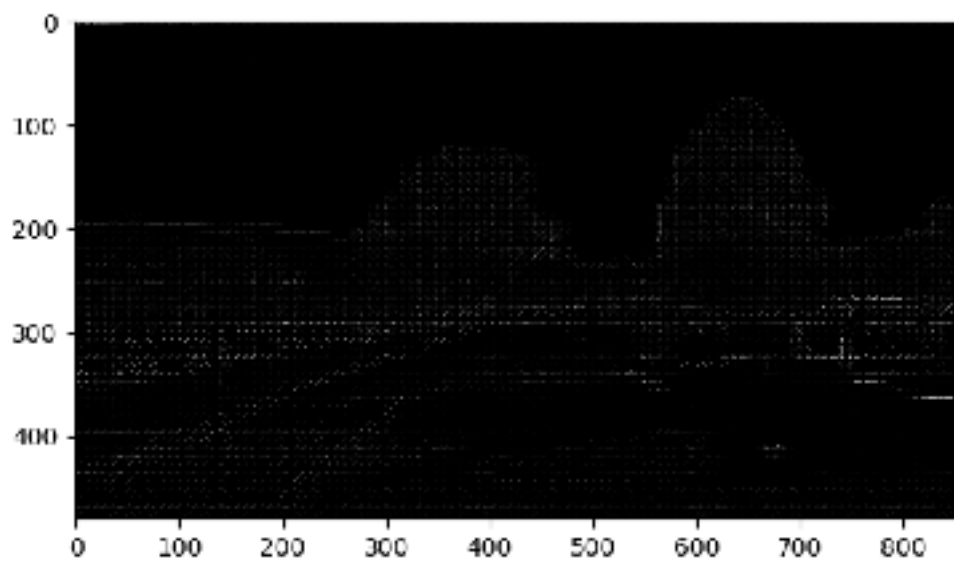
[Hog transform image from the Y channel]
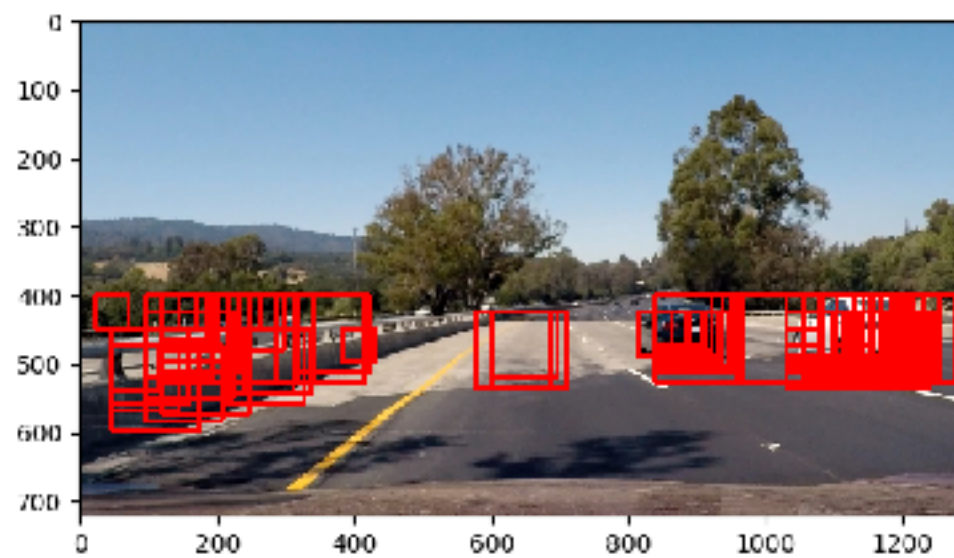
[Car Detection Boxes]
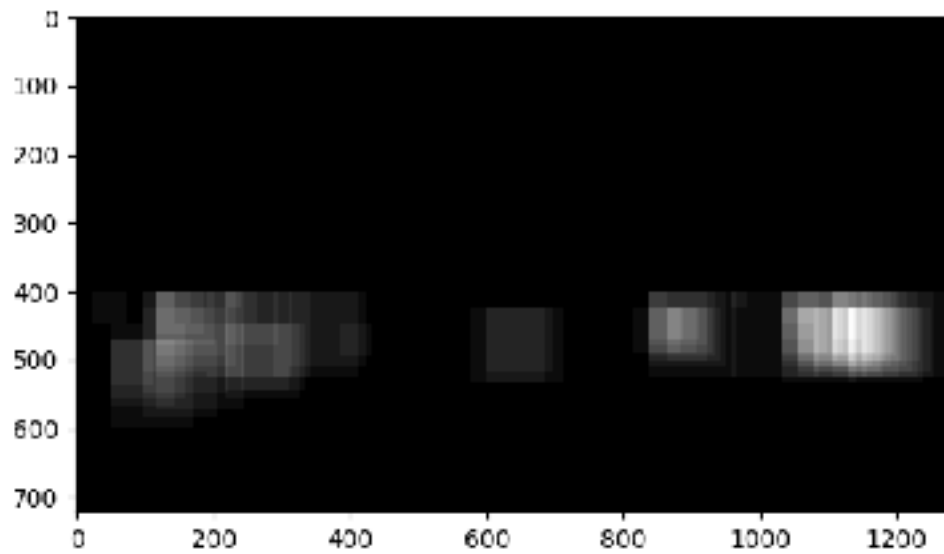
[Heat Map Image]

[Final Image]

Conclusion

In this project we managed to use SVC classification to classify car and not cars. Then apply our classifier on a real road video.