

Lane Detection with ... Deep Learning

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Problem Statement

- **Lane markings**
- **Identifying lanes of the road**
- **Keep the vehicle in the lane**
- **Performance for an autonomous vehicle**
- **Interactively and safely drive**
- **Deep neural networks to detect highway lanes.**



Challenge

- Given an image or a video, can machine identify the lane marks ?



Popular Techniques For Lane Detection

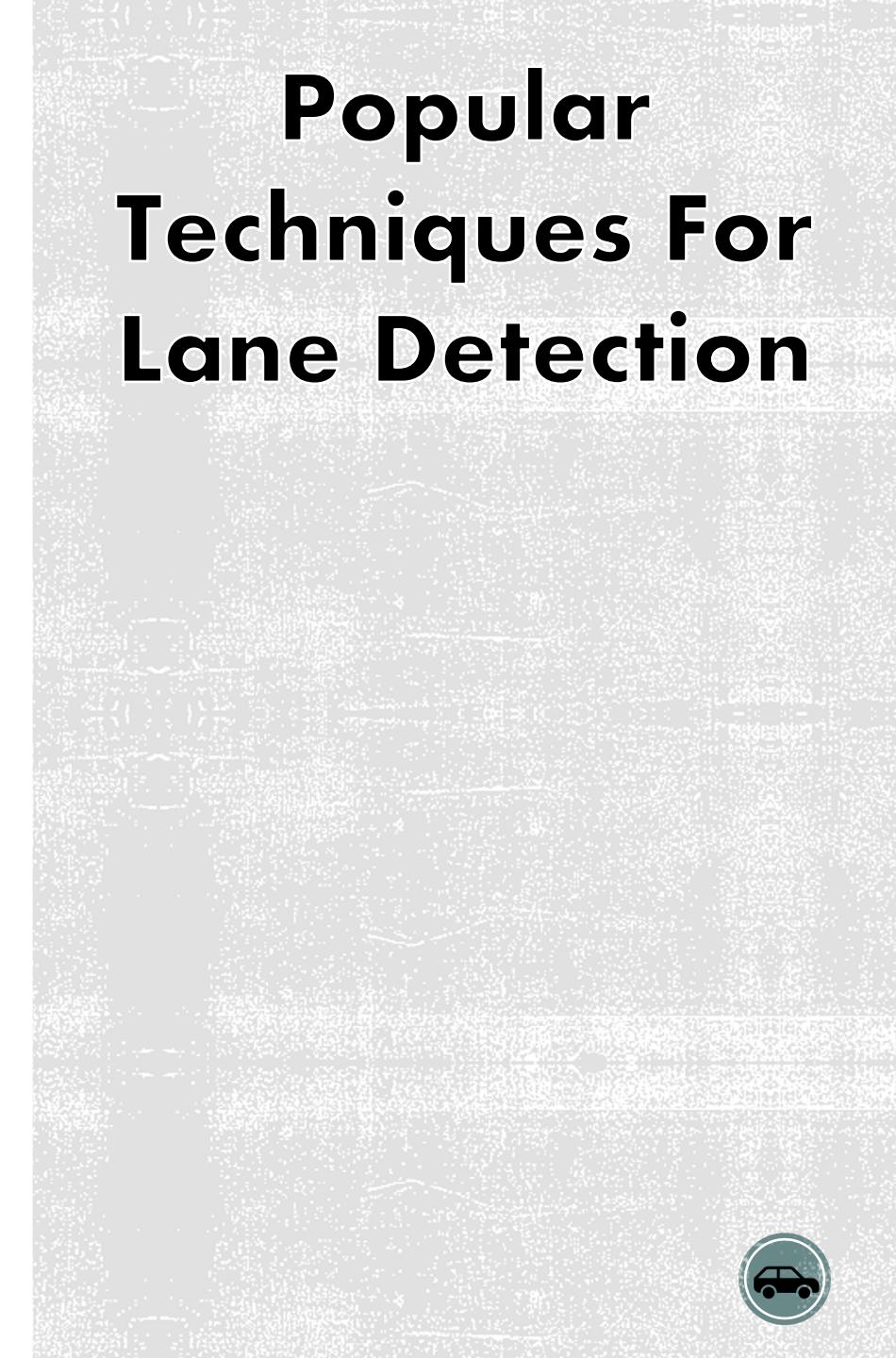


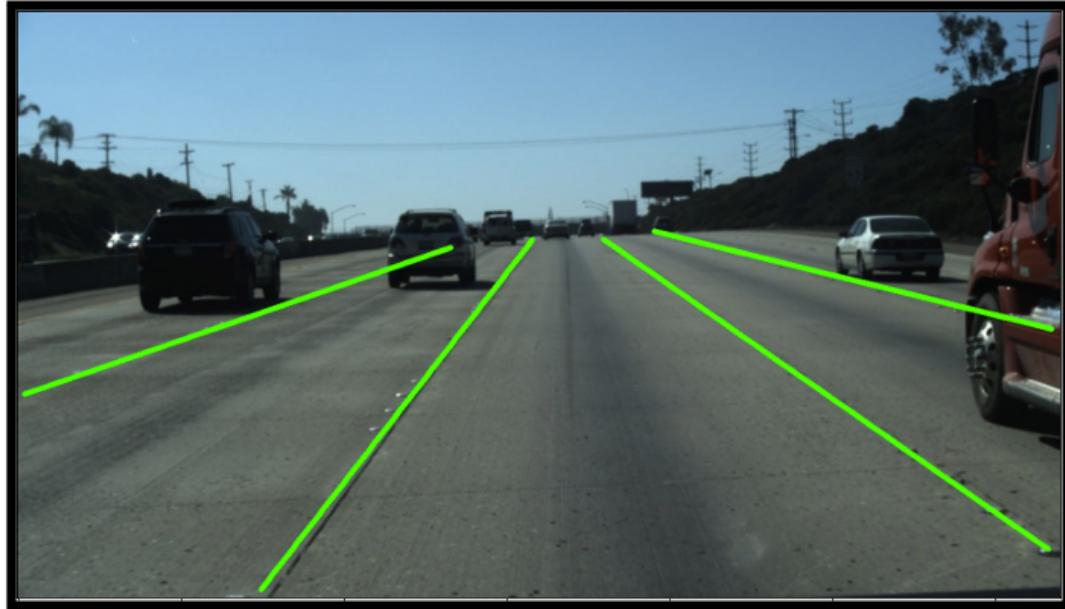
Lane Mark Detection

- Semantic Segmentation
- Instance Segmentation
- Key Points Estimation



Road Region Segmentation





Semantic Segmentation



Instance Segmentation

Segmentation Techniques



Dataset	Train	Test	Resolution	Type
Tusimple Dataset	3,700	3,000	1280* 720 (22GB)	Highway

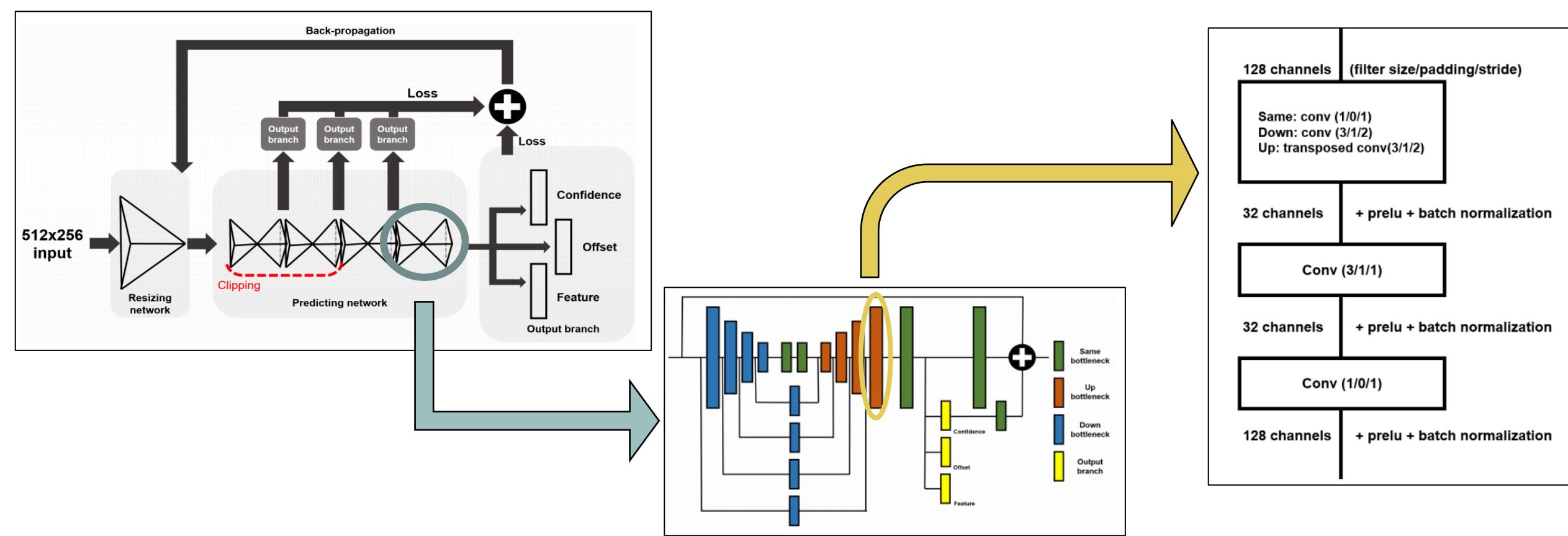
Dataset



- Using a pre-trained CNN model (PINet).
- Re-train a CNN on Tusimple Dataset
- Test on my unlabeled dataset.

Transfer Learning





Deep Learning To The Rescue!



Pros Of PINet Model

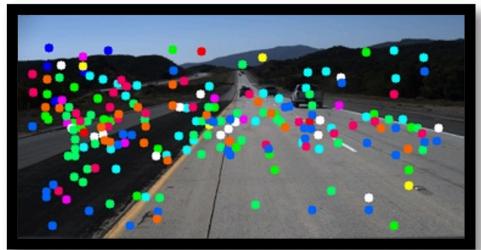
Point Instance Network

Using combined
Instance
segmentation and
key points
estimation.

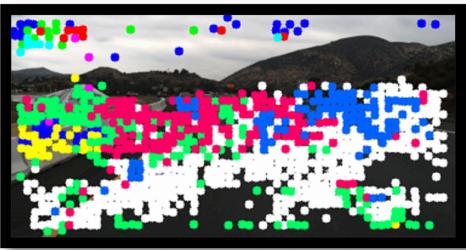
Adaptive to various
environment with
different computing
power.

Very low False
Positive rate

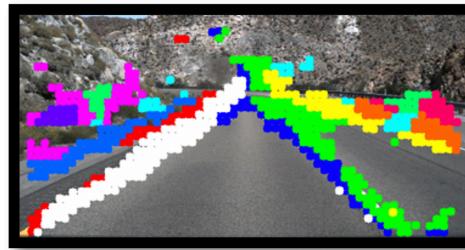




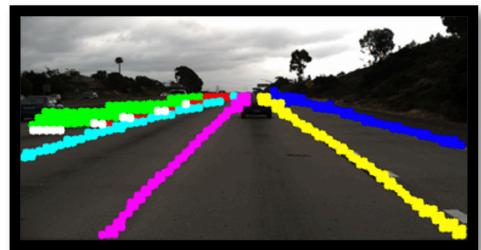
Loss 7.088



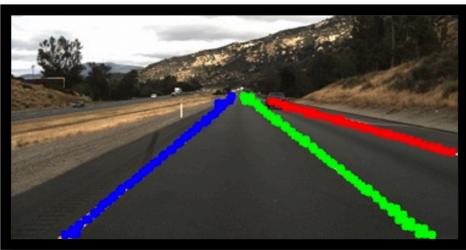
Loss 5.62



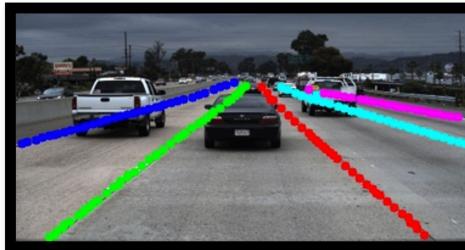
Loss 3.51



Loss 1.58

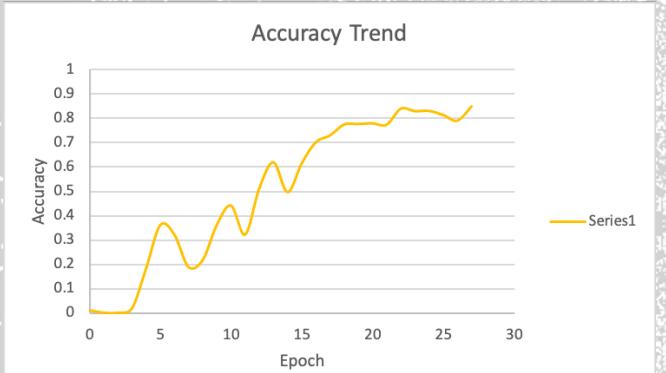


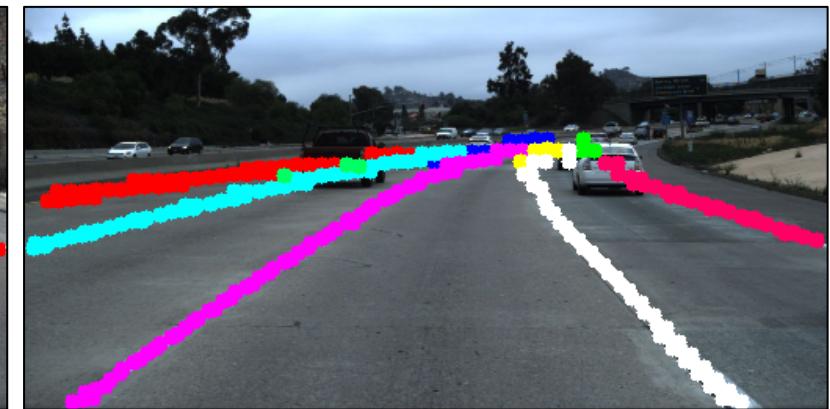
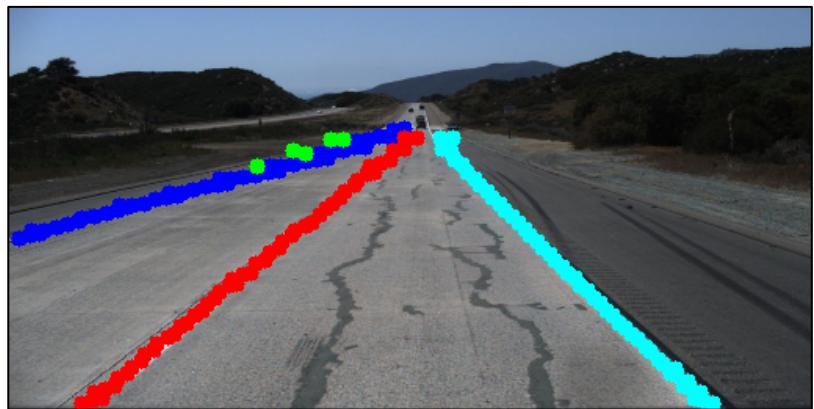
Loss 1.22



Loss 1.03

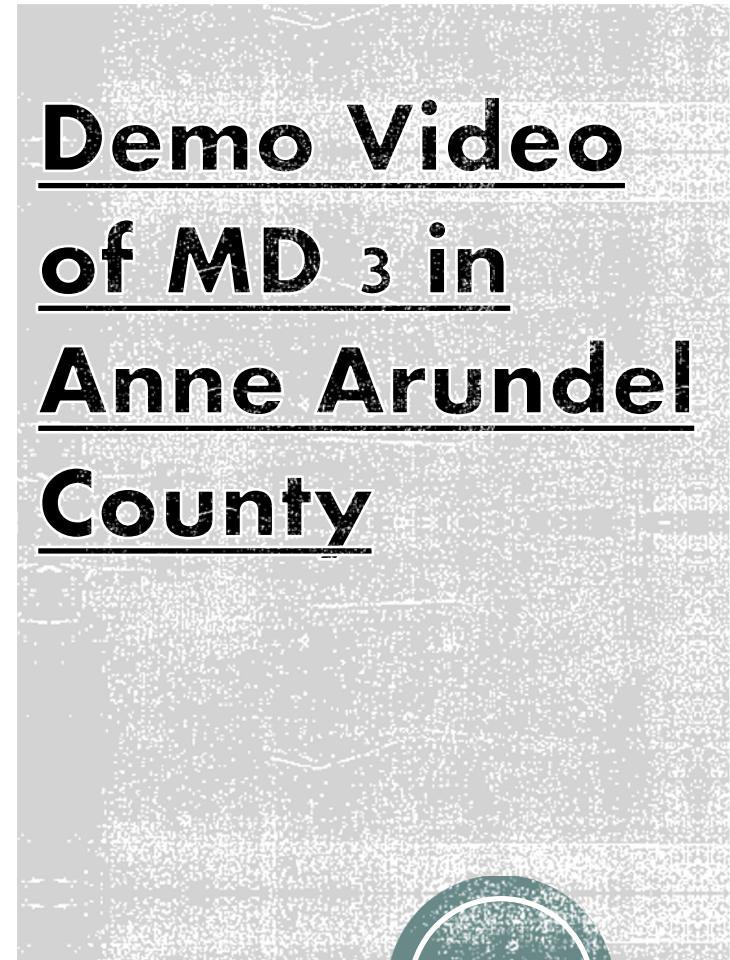
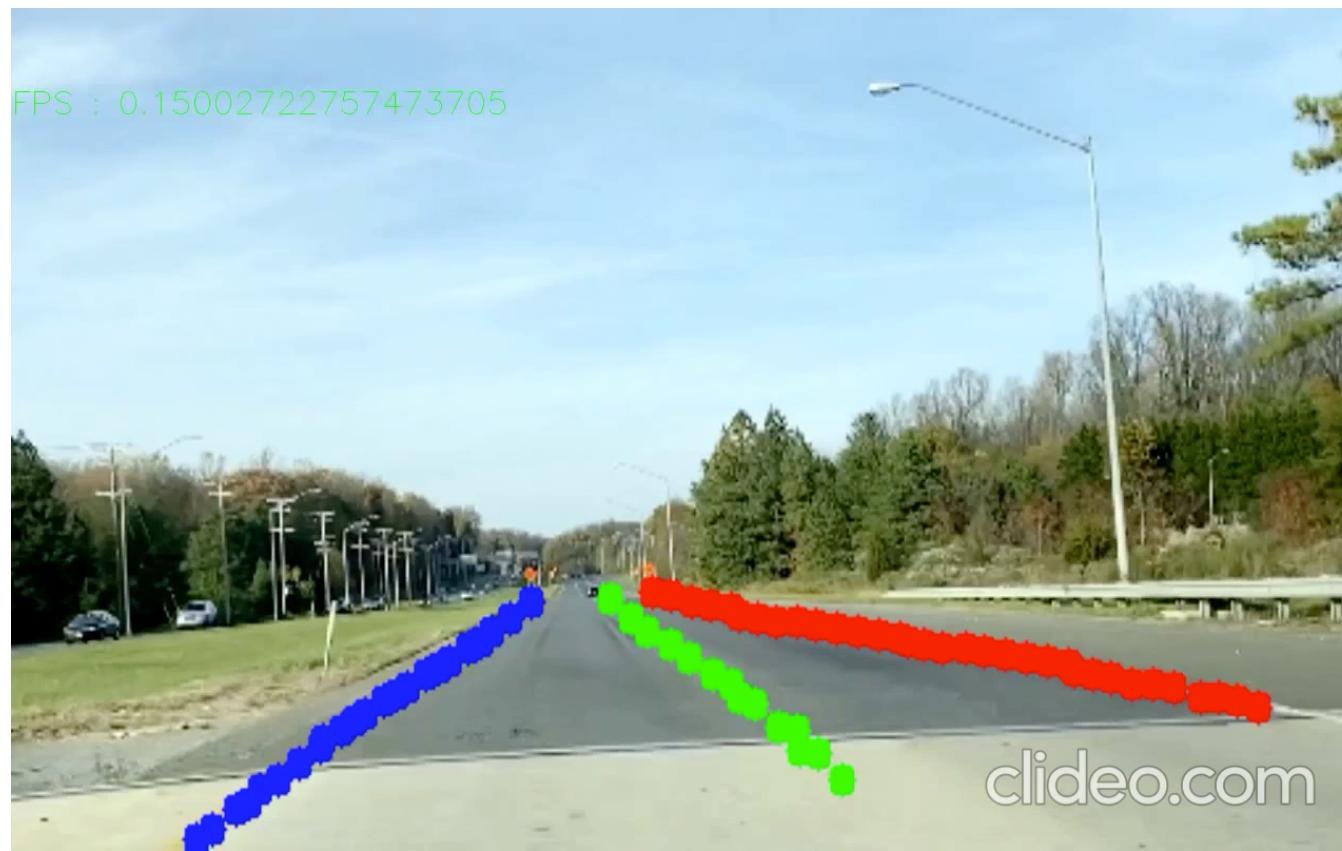
Result and Conclusion





Final Training Results





Identifying

the position of vehicle with regards to the lane marks.

Expanding

the model to detect the lane line markings, vehicles and pedestrian at the same time

Future Work

