

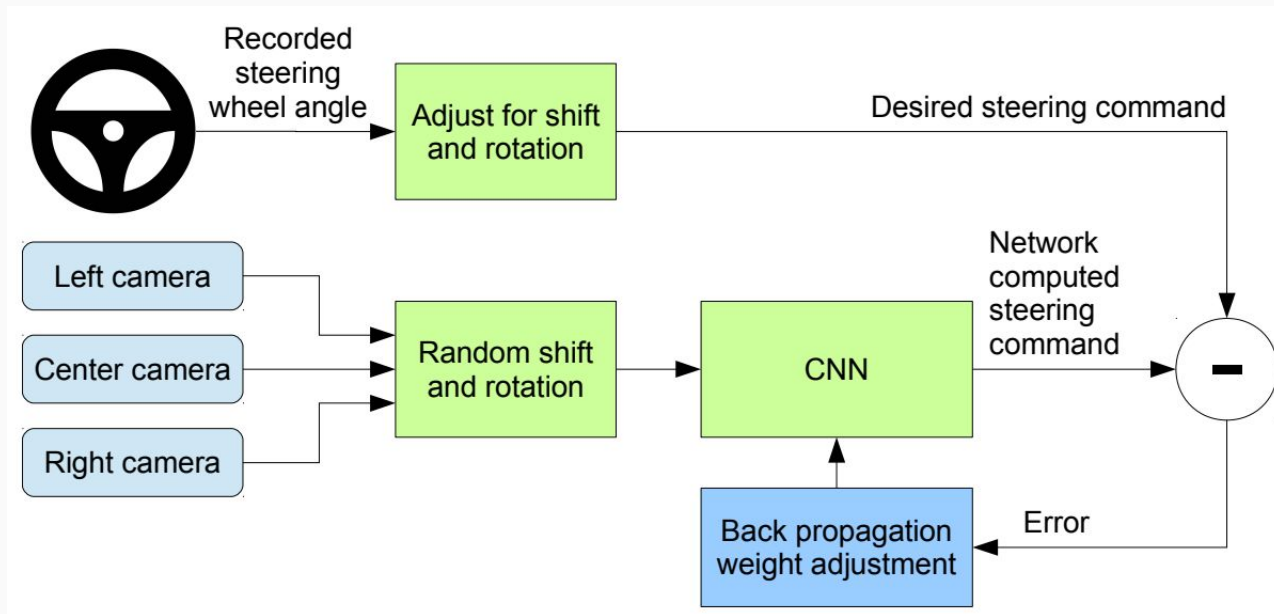
# Behavioral Cloning for Self Driving on CARLA

CSE 527 Project End Term Presentation

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# Introduction to Topic

- Paper: NVIDIA's End to End Learning for Self-Driving Cars [1]



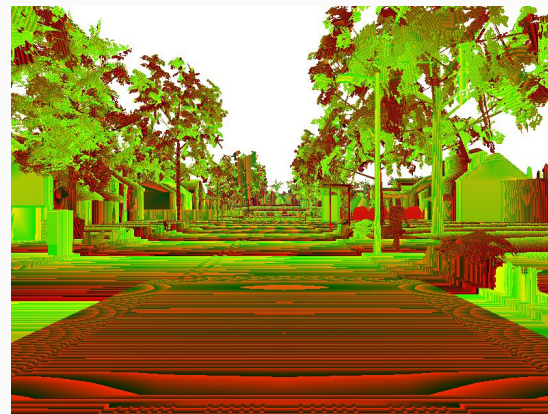
Reference: Bojarski et al, End to End Learning for Self-Driving Cars

# CARLA and Dataset

- What is CARLA?
  - Simulator for self driving vehicles

- Dataset

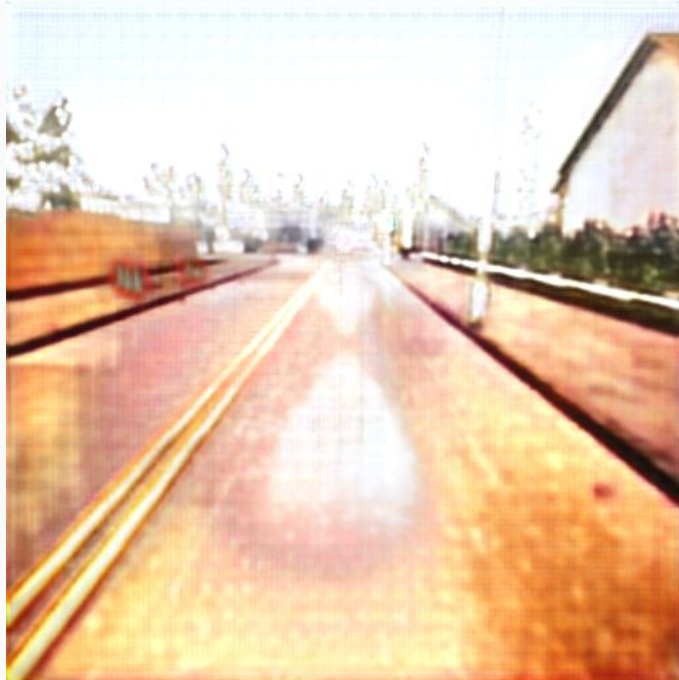
| episode_#    | center_image | steer     | speed | throttle |
|--------------|--------------|-----------|-------|----------|
| episode_0000 | 000123.png   | -0.000073 | 0.0   | 1.0      |



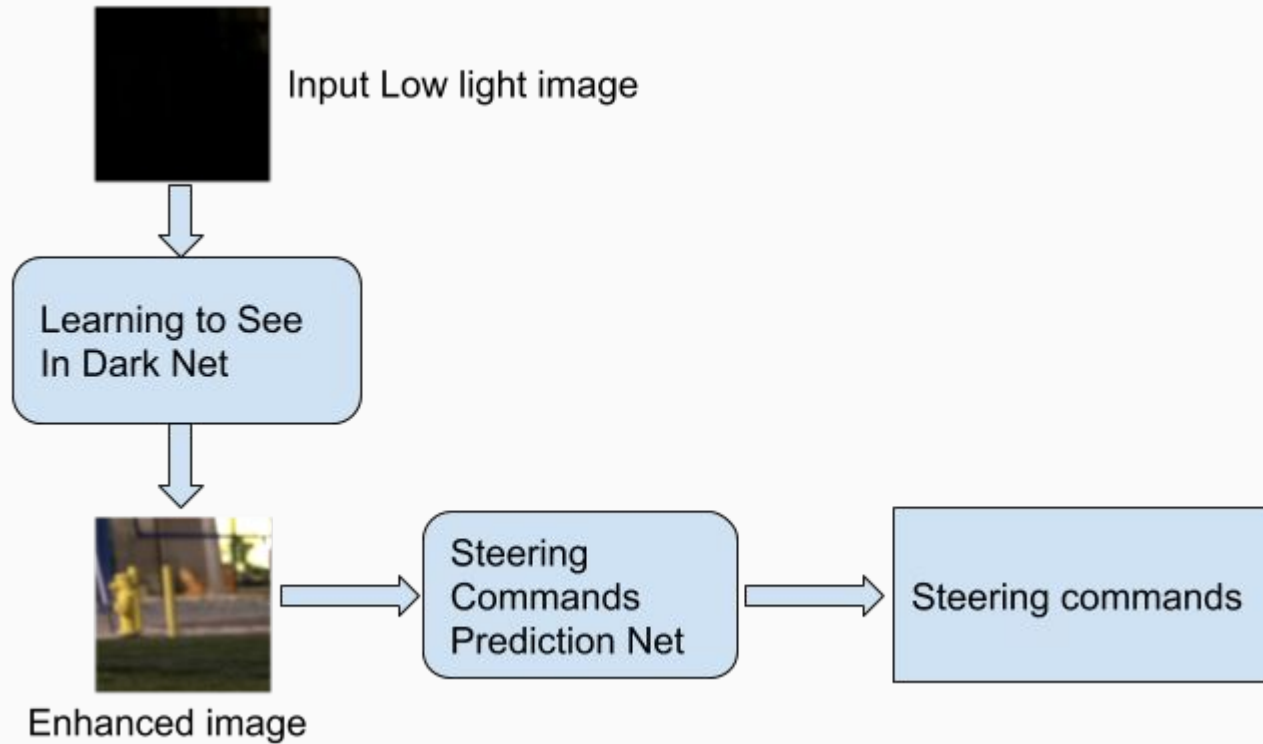
*Reference: Dosovitskiy et al, Carla an Open Urban Driving Simulator*

# Your Contribution

- We planned to improve the performance of our self driving model by using Learning to See in the Dark



# Learning to See In Dark Pipeline



*Reference: C Chen et al, Learning To See In Dark*

- Implemented the End to End learning baseline in PyTorch
- Implemented Learning to See in the Dark in PyTorch
- Collected dataset of 1,15,000 images from CARLA dataset
- Established model testing pipeline on CARLA

# Results

| Model    | Weather | Experiment | Collision | Intersection with other lanes | Intersection with off road |
|----------|---------|------------|-----------|-------------------------------|----------------------------|
| Ours     | Day     | Default    | 418       | 28                            | 485                        |
|          |         | With LTSID | 418       | 28                            | 485                        |
| Baseline |         | Default    | 0         | 0                             | 0                          |
|          |         | With LTSID | 453       | 474                           | 581                        |
| Ours     | Evening | Default    | 518       | 717                           | 569                        |
|          |         | With LTSID | 518       | 717                           | 569                        |
| Baseline |         | Default    | 0         | 0                             | 0                          |
|          |         | With LTSID | 453       | 555                           | 466                        |
| Ours     | Night   | Default    | 418       | 28                            | 485                        |
|          |         | With LTSID | 418       | 28                            | 485                        |
| Baseline |         | Default    | 818       | 123                           | 972                        |
|          |         | With LTSID | 215       | 636                           | 1028                       |





# References

- [\[1\] NVIDIA End to End Deep Learning](#)
- [\[2\] Learning To See In The Dark](#)
- [\[3\] CARLA](#)