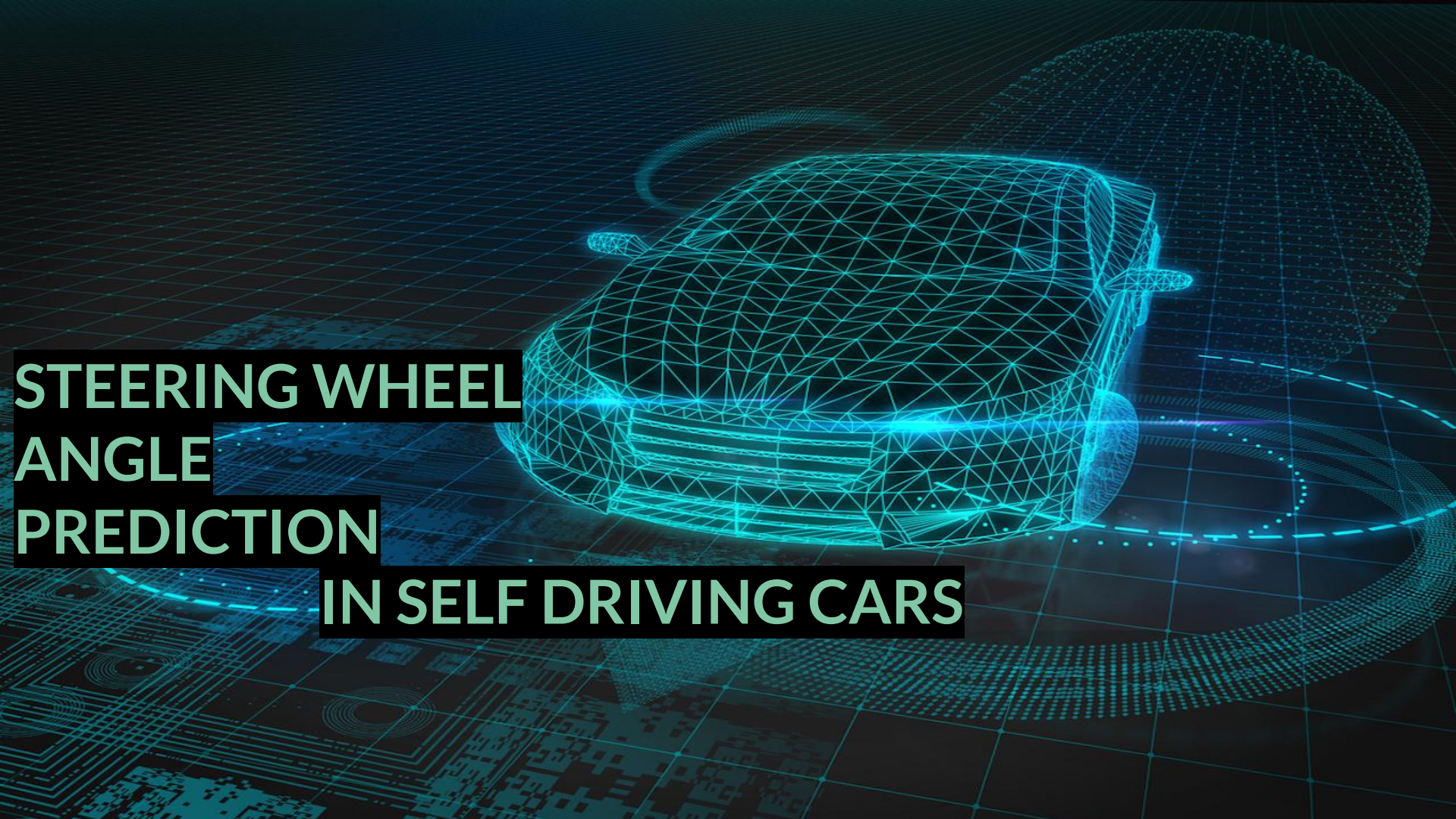

STEERING WHEEL
ANGLE
PREDICTION
IN SELF DRIVING CARS

INTRODUCTION

-> Based on the latest statistics, the reason for major fatal road accident were due to over speeding, driver fatigue and other distractions etc.

-> These problems can be overcome with the help of autonomous cars.

-> As the cars become more automated, road fatalities can be controlled.

-> With the application of Deep Learning(CNN), cars can drive autonomously without the human intervention.

PROJECT OBJECTIVE

-> While building an autonomous cars, these are some of the factors to be considered,

> Steering Wheel Angle
> Acceleration system
> Braking system

-> Our primary objective is about predicting the steering wheel angle of the car.

SOFTWARE AND HARDWARE REQUIREMENTS

SOFTWARE REQUIREMENTS

OS : GNU/Linux, Windows 10,8.1

Programming Language : Python3

Framework : Pytorch/ TensorFlow

Training Platform : Google Colabs/ Kaggle

HARDWARE REQUIREMENTS

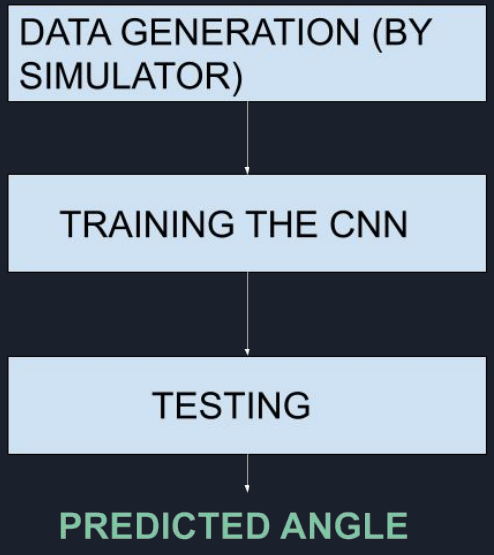
GPU : 12GB NVIDIA Tesla K80 **GPU**

Processor : Intel Core i5-7200U (7th Gen)

Ram : 8GB

Memory : 1TB HDD

WORKFLOW


DATA GENERATION (BY SIMULATOR)
TRAINING THE CNN
TESTING
PREDICTED ANGLE

STEP 1 : DATA GENERATION USING A SIMULATOR

Dataset generated by manual driving.

Car driven without human intervention

Medium Level

Hard Level

TWO VARIANTS OF DATA GENERATION

MEDIUM

HARD

GENERATED DATASET

	A	B	C
70	/home/vanquisher/Desktop/A_self_driving_car/IMG/center_2020_02_25_00_37_02_203.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/left_2020_02_25_00_37_02_203.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/right_202
71	/home/vanquisher/Desktop/A_self_driving_car/IMG/center_2020_02_25_00_37_02_281.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/left_2020_02_25_00_37_02_281.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/right_202
72	/home/vanquisher/Desktop/A_self_driving_car/IMG/center_2020_02_25_00_37_02_362.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/left_2020_02_25_00_37_02_362.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/right_202
73	/home/vanquisher/Desktop/A_self_driving_car/IMG/center_2020_02_25_00_37_02_437.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/left_2020_02_25_00_37_02_437.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/right_202
74	/home/vanquisher/Desktop/A_self_driving_car/IMG/center_2020_02_25_00_37_02_521.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/left_2020_02_25_00_37_02_521.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/right_202
75	/home/vanquisher/Desktop/A_self_driving_car/IMG/center_2020_02_25_00_37_02_598.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/left_2020_02_25_00_37_02_598.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/right_202
76	/home/vanquisher/Desktop/A_self_driving_car/IMG/center_2020_02_25_00_37_02_681.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/left_2020_02_25_00_37_02_681.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/right_202
77	/home/vanquisher/Desktop/A_self_driving_car/IMG/center_2020_02_25_00_37_02_764.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/left_2020_02_25_00_37_02_764.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/right_202
78	/home/vanquisher/Desktop/A_self_driving_car/IMG/center_2020_02_25_00_37_02_849.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/left_2020_02_25_00_37_02_849.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/right_202
79	/home/vanquisher/Desktop/A_self_driving_car/IMG/center_2020_02_25_00_37_02_933.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/left_2020_02_25_00_37_02_933.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/right_202
80	/home/vanquisher/Desktop/A_self_driving_car/IMG/center_2020_02_25_00_37_03_015.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/left_2020_02_25_00_37_03_015.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/right_202
81	/home/vanquisher/Desktop/A_self_driving_car/IMG/center_2020_02_25_00_37_03_098.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/left_2020_02_25_00_37_03_098.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/right_202
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83	/home/vanquisher/Desktop/A_self_driving_car/IMG/center_2020_02_25_00_37_03_260.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/left_2020_02_25_00_37_03_260.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/right_202
84	/home/vanquisher/Desktop/A_self_driving_car/IMG/center_2020_02_25_00_37_03_341.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/left_2020_02_25_00_37_03_341.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/right_202
85	/home/vanquisher/Desktop/A_self_driving_car/IMG/center_2020_02_25_00_37_03_423.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/left_2020_02_25_00_37_03_423.jpg	/home/vanquisher/Desktop/A_self_driving_car/IMG/right_202

Path of Center camera image.

Path of left camera image.

Path of right camera image.

GENERATED DATASET CONTD.

	D	E	F	G	H	I	J
76	0	1	0	30.19031			
77	0	1	0	30.18985			
78	0	1	0	30.19006			
79	0.2	1	0	30.18193			
80	0.4	1	0	30.15741			
81	0.6000001	1	0	30.13366			
82	0	1	0	30.18476			
83	0	1	0	30.18926			
84	0	1	0	30.19019			
85	0	1	0	30.19036			
86	0	1	0	30.18876			

Reduced Steering angle

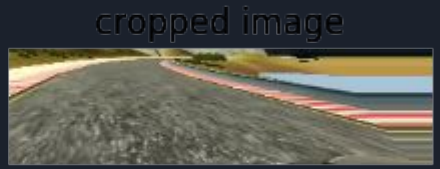
Throttle

Brake

Speed

PRE-PROCESSING: AUGMENTATION

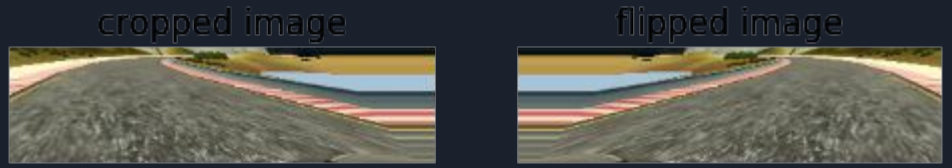
i) CROPPING



- The images captured from the simulator include unnecessary information (like sky).
- So we are cropping out unwanted information.

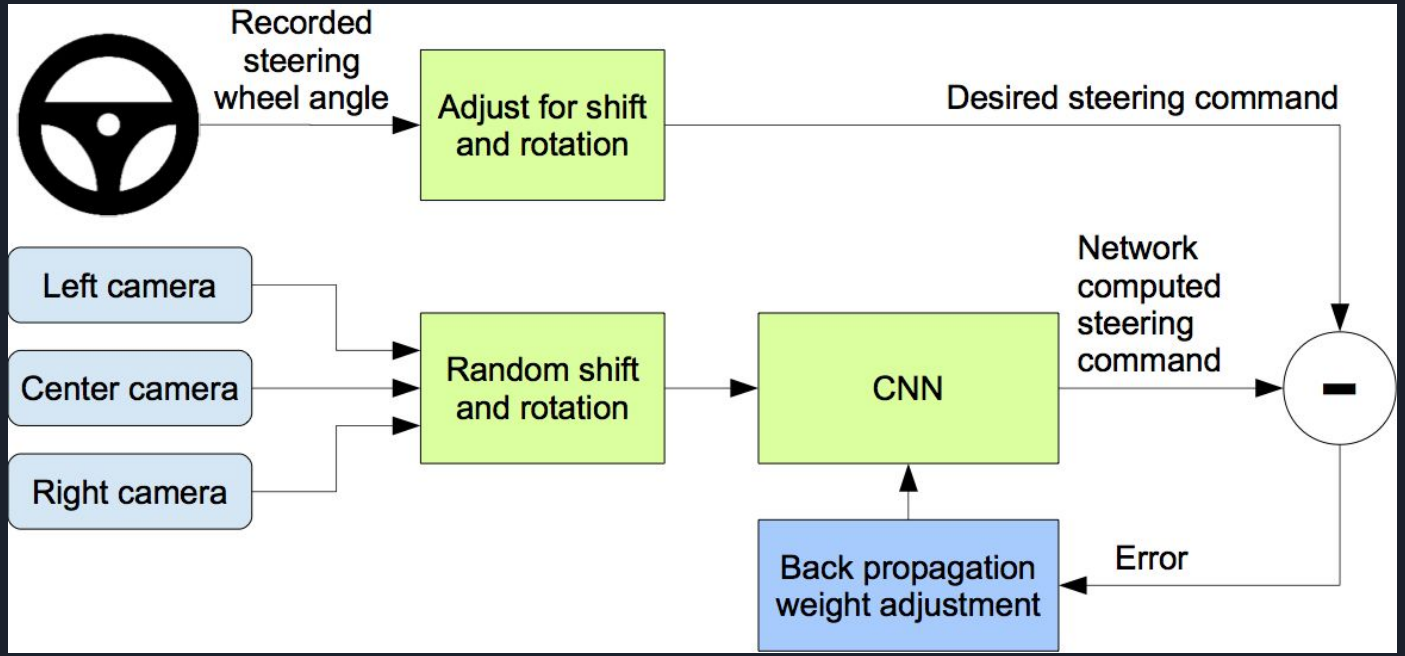
PRE-PROCESSING: AUGMENTATION Contd.

ii) FLIPPING



- Our dataset contains more images of right turns.
- To get better accuracy we are flipping the images, so that it appears like left turns.

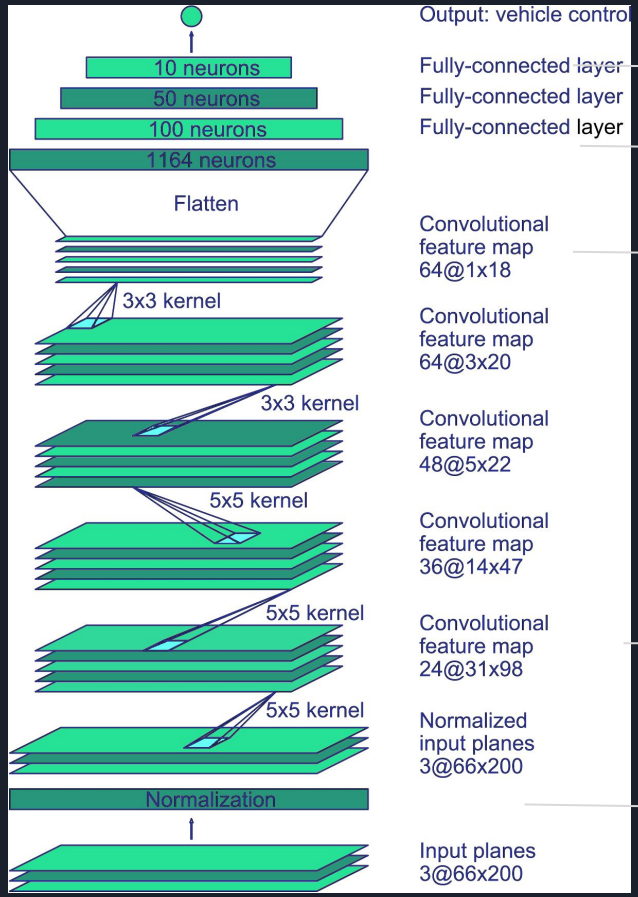
STEP 2 : TRAINING



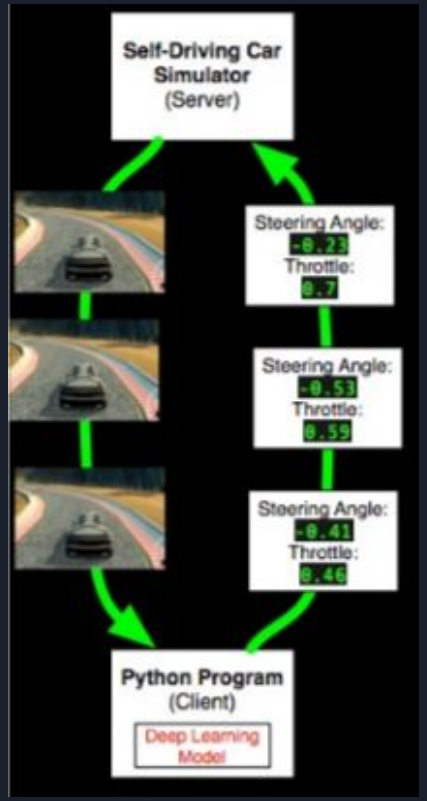
Training : High level overview of the project

CNN

9 layered Convolutional Neural Network



STEP 3 : TESTING

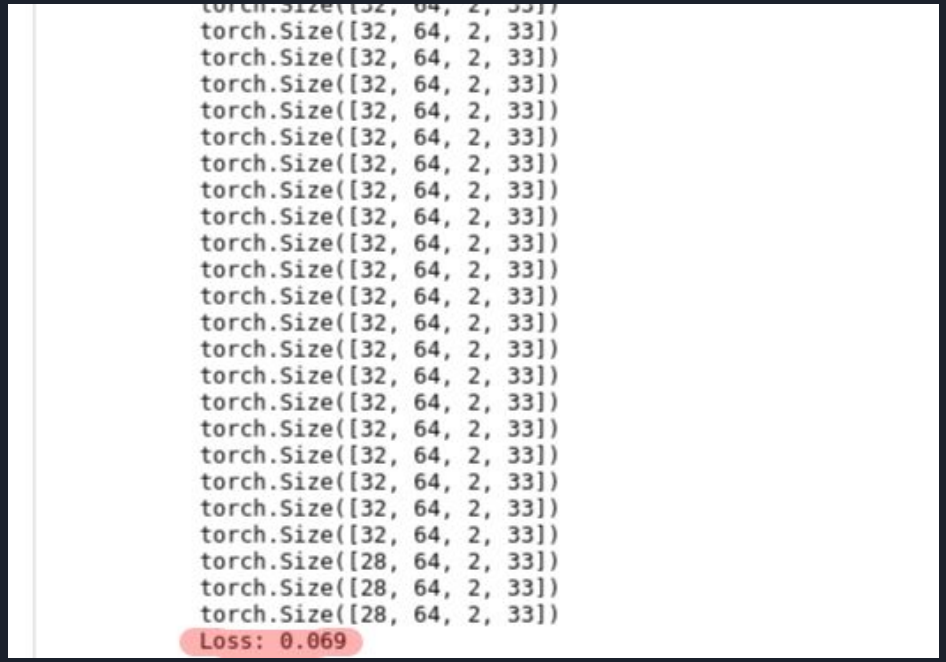


We can think as **Client - server** model:

Our ***trained model acts as a client***. It pops out steering angles continuously.

The ***simulator acts as server***. When it gets the steering angle it gives out corresponding image.

LOSS



Our model was able to produce the loss of **0.069**

CONCLUSION

- We can conclude that trained CNN model can drive the car autonomously without the intervention of the human, without manually coding the lane detection part.

TEAM A11

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THANK YOU