

Spring 2022: CSEE5590/490 – Special Topics

Python and Deep Learning

Project – Phase I

Project Phase I Submission 1 (Due 3/23/2022 11:59 pm CST)

Team name: Techletes (Group 4)

Team Members Names:

1. Gopesh Thakur
2. Kapil Sharma
3. Jinal Patel
4. Andrew Abbott

Project Intro Phase-I: (20% of the project weight)

- Should accurately and passionately describe real-world problems facing the targeted users or audience.

- Describe with detailed answers to the best of your knowledge, it's okay to update your project in the future.

- Make sure at least for this project your team is applying machine learning algorithms, it is highly recommended you use deep learning.

- We can provide you with some IoT devices for your project (Nvidia Jetson Nano, Raspberry pi-3, sensors).

- Make sure you add references to your project if you are re-using someone's else solution or idea.
- Each project phase will be evaluated based on the submission completeness and clarity of the project idea from the documentation.
- Remember, it is very important to have an application interface for your project, it can be a website in most cases or a mobile app.
- Look for easy to use and free services to host your project:
 - o AWS, Google Cloud, Heroku, ...

Answer the following question:

1) Define the scope or domain of the project (where the use case is relevant or prevalent)?

To develop an Autonomous driving system for vehicles using camera based environment sensing systems for game environment which will be based on Deep Neural Network (CNN).

Train an end to end deep learning model that would let a car drive by itself around the track in a driving simulator. It is a supervised regression problem between car steering and road images which will be visualized through camera.

Incorporate systems to prevent accidents by detecting nearby vehicles and other obstacles based on the camera information.

Presentation will consist of video based demos showing the abilities of the final system.

2) What is your main story (Objective of the project)?

In this project we will explore the possibility of using vehicle mounted video input for training deep neural networks for autonomous driving. We will explore various architectures of convolution neural networks in order to implement autonomous driven vehicles.

3) What is the problem that you are trying to solve?

In near future, it is expected that Autonomous vehicles will be used for all traveling purposes.

Autonomous vehicles can -

- a) Reduce man power where drivers are needed thereby reducing cost
- b) Avoids manual driving errors thus reducing chances of accidents and injuries.
- c) Enable specially abled people or person who cannot drive
- d) Large Transport vehicles need specific driving skills in drivers which is a constraint for transportation systems. Autonomous vehicles will remove this constraint.

4) Who are the characters or people in the main story (end users of the application)?

The end users for this system would be vehicle owners or operators of the vehicles that have this system installed onboard.

5) What are the current solutions to the problem that you want to solve (your competitors)? What technology they are using to solve the problem?

Current Autonomous driving systems use a mixture of LIDAR, RADAR, and optical image sensors to build a model of the surrounding environment. These systems each build a model of the surrounding world which is combined to give the AI system information to make a decision regarding the next move it should make.

6) Why your solution is better than the one described in the previous question? (Describe the novelty of your approach)

Our system will utilize computer vision and machine learning to better detect obstacles and roadways to allow the vehicle to go to its destination more efficiently and safely.

7) What technology (programming language, algorithms, libraries, tools) you will be using to accomplish this project?

Python

Pandas/Keras/Numpy

Opencv

Tensorflow

Game environment (such as Grand Theft Auto 5)

8) Which dataset are you using for this project (if available, please provide the data link, source, citation)?

Datasets will be generated in the process of developing the system

- References (use proper citation "IEEE, MLA, APA"):

- 1 Simulation of Self-driving System by implementing Digital Twin with GTA5

<https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9369807>

- 2 Self-Driving Car Steering Angle Prediction Based On Deep Neural Network
An Example Of CarND Udacity Simulator

<https://ieeexplore.ieee.org/document/8747006>

- 3 Obtain Datasets for Self-driving perception from Video Games
automatically

<https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8718910>