

6Homework 2

Student Name: _____

AuE 8200: Machine Perception and Intelligence

Instructor: Dr. Bing Li, Clemson University, Department of Automotive Engineering

- * Refer to [Syllabus](#) for homework grading, submission and plagiarism policies;
- * Submission to Canvas (**Due: Feb. 9, 2022 11:59 pm**), including:
 - This document (with answers), and with your program results/visualization;
For this homework, you may put the screenshots of the results in the submission document.
 - A .zip file of source code (and data if any) with names indicating question number;
- * You can choose either Python, Matlab or any other programming language.
- * You can find some sample codes from the course [GitHub Repo](#) if you use Python.

1. For [NuScene](#) dataset access, you may need to register on that website. To save time, you can download only the Full dataset/Mini set: (5 point)

Mini ▾

Subset of trainval, 10 scenes, used to explore the data without downloading the whole dataset.

↓ Metadata and sensor file blobs [\[US, Asia\]](#)

3.88 GB (4167696325 Bytes)

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2. If you use Python, set up the NuScene [develop kit](#) locally, you may need to install Anaconda and Jupyter notebook; If you use Matlab, setup your Matlab for this data process. (5 point)
3. Pickup a set of data, including Image, Lidar, and Radar data. Visualize them respectively. If you use Python, you can refer to NuScene dev-kit tutorial [reference code](#). (10 points)
4. Rather than using NuScene dev-kit, implement below by yourself (total 35 points):
 - (1) Visualize images (you can use library OpenCV or others), [Sample code](#). (5')
 - (2) Visualize Lidar point cloud data
 - a. You can refer to this [sample code](#).
 - b. Colorize points by height, intensity, and semantic label respectively.
 - i. Height is the Z value for a point. (5')
 - ii. You can get intensity referring the code [here](#). (5')
 - iii. You can get semantic label from the sample above code. (5')
 - (3) Visualize Radar data
 - c. Use any other library (e.g, Open3D, PCL, etcl) or modify the previous sample code to visualize the Radar data which you chosen. (5')
 - d. Colorize points by below two variable aspects respectively.
 - i. For height (if it's all zero, you can colorize the points by distance), (5')
 - ii. For velocity, you can find some velocity information from [here](#). (5')
5. Using NuScene dev-kit for the set of data which you picked up: (45 points)
 - (1) Visualize Radar data projection on image
 - a. Print calibration info (between Radar and Camera sensors) by referring code [here](#). (5')
 - b. Explain the above calibration info, and pipeline of First~Fifth steps in the code. (10')
 - c. Visualize Radar data projection on image based on calibration info. (10')

- (2) Visualize LiDAR data projection on image
- d. Print and explain the calibration info (between LiDAR and Camera sensors) by referring [here](#). (5')
 - e. Visualize LiDAR data projection on image based on calibration info. (15')