Group Name：The Fellowship of the 100

Member: Chaofu Zhang, Yuan Le, Qianhui Cen

Dataset: Peking University/Baidu - Autonomous Driving(5GB)
https://www.kaggle.com/c/pku-autonomous-driving

Data Description:

Images(*6283 real-world images; train(4262) / test(2021)*):

Dataset contains photos of streets, taken from the roof of a car.

Pose Information *(train.csv(4262))* :

The primary data is images of cars and related pose information.

The pose information is formatted as strings, as follows: model type, yaw, pitch, roll, x, y, z

Image Masks *(test_masks.zip / train_masks.zip)* :

Some cars in the images are not of interest (too far away, etc.)---Binary masks.

Car Models(*60,000 labeled 3D car instances from photos*) :

3D models of all cars of interest are available for download as pickle files - they can be compared against cars in images, used as references for rotation, etc.60,000 labeled 3D car instances from photos

Problem:
The problem in this project is to build an algorithm to estimate the 6 poses of vehicles from one single image in a real-world traffic environment. Then we are going to anticipate how a vehicle would do autonomous driving based on the analysis of the surroundings (position of nearby automobiles). We choose this problem because we want to explore the truth of autonomous driving and find out if there is space to improve self-driving to made this technique widespread.

Deep Network: MLP / CNN

Framework: Pytorch / Tensorflow; Pytorch is better for customizing the network.

Performance Index: Mean average precision

Schedule: We aim to finish our project (coding) by November 29th so as to begin the report part and the other material.

References

6 DoF Vehicle Pose Estimation for Autonomous Racing

https://justinyuzheng.com/research-6dof/

6D-VNet: End-to-end 6DoF Vehicle Pose Estimation from Monocular RGB Images

http://openaccess.thecvf.com/content_CVPRW_2019/papers/Autonomous%20Driving/Wu_6D-VNet_End-to-End_6-DoF_Vehicle_Pose_Estimation_From_Monocular_RGB_Images_CVPRW_2019_paper.pdf

NVIDIA 6-DoF pose estimation trained on synthetic data

https://www.therobotreport.com/nvidia-grasping-system-synthetic-data/

Fundamentals of car science : Pitch, roll and yaw

https://carsexplained.wordpress.com/2017/02/21/fundamentals-of-car-science-pitch-and-roll/

Self-driving Research in Review: ICRA 2019 Digest

https://medium.com/lyftlevel5/self-driving-research-in-review-icra-2019-digest-e914405fe598

6-PACK: Category-level 6D Pose Tracker with Anchor-Based Keypoints

https://sites.google.com/view/6packtracking/home