Apollo Auto

Perception Module

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Overview

1. Apolloscape Dataset
2. Udacity – Apollo Auto Video Course
3. Perception Module (L4)
4. Questions Regarding HD Map
5. Bonus Section

1. Apolloscape Dataset

- Lidar Point Cloud Obstacle Detection & Classification
- Traffic Lights Detection
- Road Hackers
- Obstacle Detection Image Based
- Obstacle Trajectory Prediction
- Scene Analysis

AI Problems

2. Udacity – Apollo Auto Video Course

- L1 - Self-driving Overview
- L2 - HD Map
- L3 - Localization
- L4 - Perception
- L5 - Prediction
- L6 - Planning
- L7 – Control
- L8 - Summary & Course datails

3. Perception Module (L4)

The perception module incorporates the capability of the follows -

- 5 cameras (2 front, 2 on either side and 1 rear)
- 2 radars (front and rear)
- 3 LiDARs, 16-channels (2 rear and 1 front)
- 1 LiDAR, 128-channels
  - to recognize obstacles and fuse their individual tracks to obtain a final track list
- Sensor based perception

3. Perception Module (L4) Video Content

1. 32 - Intro
2. 33 - Sebastran’s
3. 34 - Computer Vision
4. 35 - Camera Images
5. 36 - LiDAR Images
6. 37 - Machine Learning
7. 38 - Neural Network
8. 39 - Backpropagation
9. 40 – CNNs
10. 41 - Detection Classification
11. 42 - Tracking
12. 43 - Segmentation
13. 44 - Apollo Perception
14. 45 - Sensor Data Comparisons
15. 46 - Perception Fusions Strategy
16. 47 - 16 Vehicle Detection Project From SDCND
17. 48 - Summary

4. Questions Regarding HD Map

- What is HD Map?
- How the detections are fitting in HD map?
- Are detections favorable to the HD map?

References

- Apolloscape Datasets
- Apollo Baidu Udacity Videos
- Apollo Perception Module - Github
- Apollo Perception Module

Bonus Section

Sensors, Datatypes & CV Tasks

Sensors	• Lidar • Radar	Camera	Stereo camera	IMU/GPS	?
Inputs	3D pointcloud	2D images	Depth images		?
CV Tasks	Classification	Detection	Segmentation		?

Note -
?: Unknown
(like telemetry information, meta-data information useful for sensor fusion)

AI Application Area

Application area	Road	Non-road	Satellite	Metadata	Combination of all
Type	• Lanes • Edges • Lane/Flow detection/tracking	• Traffic light,Temproral traffic light recognition • Traffic sign • Signage	• Center lines • building footprints • 3D buildings	Georeferencing in real world for detected and extracted geometries	Automation of all
Annotation	Polygon	Point (2D/3D)	line and polygon		

Challenges In Current Work Of AI

- Increasing the accuracy and decreasing the response time
- Extract more & more map components for HD Map
- Road specific detections like lanes, edges

Any Questions?