3D LiDAR Vehicle Perception and Classification Using 3D Machine Learning Algorithm

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Abstract 3D LiDAR-based object detection during autonomous vehicle navigation is a trending field in autonomous vehicle research and development. As 3D LiDAR is resistant to light interference while capable of capturing detailed 3D spatial structures of the detected objects, it is the main perception sensor for autonomous vehicles. With its improved accessibility in the recent years, the advent of deep learning had allowed feature learning from sparse 3D point clouds. Hence, this leads a plethora of methods in object detection for 3D sparse point clouds. In this research, an extensive experiment was conducted using various 3D LiDAR object detections for various forms like pillar-form, point-form and voxel-form onto multiple point cloud data sets captured using Robotic Operating System (ROS). Based on experiments conducted, pillar-form point cloud data is suitable for dense point clouds, while voxel-form is optimal for both indoors and outdoors environment.

Keywords LiDAR · 3D point cloud · Autonomous vehicle · 3D machine learning

1 Introduction

Autonomous vehicle (AV) is a ground breaking technology aimed to reduce the rate of traffic accidents. For an autonomous vehicle to operate, it requires a myriad of sensors for environment detection and vehicle perception. Generally, for an autonomous vehicle (AV) to navigate, there are five key components [1] which are perception,

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