Abstract

Novel GPU Enabled Deep Learning Architecture for LIDAR based auto labelling for Autonomous Vehicles

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Abstract:

As Autonomous vehicles (AV) are closer to becoming reality, it becomes mandatory to be able to characterise the performance of the sensors used in AV before it gets into production deployment. This validation process requires large amounts of ground truth data to be established with precise information about the real world position and pose of the objects around the vehicle. LIDAR is a preferred sensor for ground truthing due to its ability to estimate the depth of the objects precisely. In order to reduce the manual efforts in ground truthing,.In this paper, we propose a novel deep learning network for automated object detection and pose estimation on LIDAR point cloud data, for automated ground truthing. The algorithm is based on a multi-layer deep 3D convolutional neural network with a custom loss function and activation layers. Typically, the volume of point cloud input data itself is huge plus the computational complexity makes training and inferencing highly time intensive. The architecture of the deep learning network is considered in such a way, that the activation functions for the particular layers are designed based on the sensitivity of the feature, which is being extracted from that layer .This helped in saving time of computation with our compromising the accuracy of feature extraction. Loss function was designed so that it utilizes regression to achieve efficient localization of objects. Though the architecture of the network helped improving, the speed of training and inferencing, further improvement was required for efficient training turnaround time and real time inferencing, which was achieved with efficient utilisation of NVDIA GPUs, which was the hardware, used to deploy the automated labelling algorithms The above approaches ensured real time execution of the inferencing engine on Velodyne HDL 64 and 128 LIDAR, which was essential

for real time labelling and ground truthing

Biography:

Manoj CR is currently working as a lead for AI and Deep Learning for AV and ADAS in TCS. Primarily responsible for conceptualizing and designing new AV and ADAS features for Car OEMs and Tier 1 suppliers across the globe and identifying and developing futuristic solutions and accelerators for Autonomous vehicle development in TCS. Manoj has 16 years of experience in new product development in AI technologies in automotive , consumer devices and industrial application.He is a primary inventor of 12 patents granted in US,Japan and India.

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