

Deep Neural Networks for 3D Shape Recognition

Considering deep neural networks for 3D data instead of 2D images, it is challenging because of the limited computation runtime and memory, as well as different data types (color images with depth data, image sequences or videos, CAD models etc.). The mainly existing 3D benchmarks are using LiDAR, RGBD and CAD data. These datasets are mainly ModelNet from Princeton, NYU RGBD data, Sydney urban object data, and KITTI data.

The existing popular deep learning algorithms for 3D data can be used real-time for Robotics, such as VoxNet, PointNet and Vote3Deep. The task of this master thesis is mainly using PointNet and Vote3Deep algorithms. They need to be compared using existing benchmarks. Considering that they are real-time and can be used for robotics, realizing one of them into our robots (either SCITOS G5 or self-built Quadrocopters) for both indoor and outdoor is necessary.

Requirements:

- C++ and Python for tensorflow
- Better familiar with ROS
- Communicate in English

References:

1. PointNet: a 3D CNN for real-time object class recognition, IJCNN 2016
2. Vote3Deep: fast object detection in 3D point clouds using efficient CNNs, ICRA 2017

Kontakt

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