

Enhanced Ground Extraction and Object Detection using 3D Flash LIDAR

► Objectives

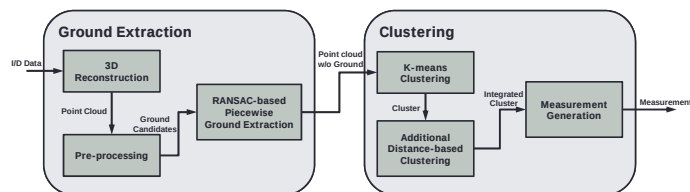
- ◆ Development of ground extraction and clustering algorithm to enhance object detection performance

► Introduction

- ◆ Provision of intensity and depth map data from 3D Flash LIDAR that represents of the object and ground information
- ◆ Ground extraction in order to remove ground information because the raw data includes ground points
- ◆ Measurement generation using K-means clustering algorithm that is also crucial to obtain high object detection performance
- ◆ In order to improve K-means clustering, additional distance-based clustering is developed to integrate adjacent clusters

► Algorithm Flowchart

- ◆ Ground candidate and division area selection in pre-processing step
- ◆ RANSAC-based piecewise ground extraction
- ◆ K-means clustering with additional distance-based clustering



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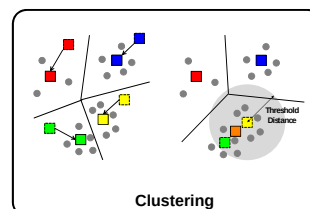
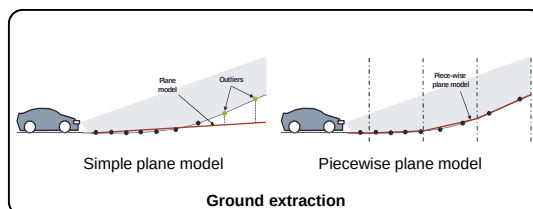
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► Ground Extraction

- ◆ Application of ground extraction based on RANSAC algorithm in order to omit ground points from 3D reconstructed point cloud
- ◆ Occurrence of unexpected outliers in the case of extraction of ground information using a simple plane model because of various road slope and roll according to longitudinal distance
- ◆ Improvement of the ground extraction using piecewise plane model in such various road conditions

► Clustering

- ◆ K-means clustering with sufficiently large K at first in order to obtain clusters that represent all possible measurements
- ◆ Merging adjacent clusters using additional distance-based clustering to improve over-clustering problem caused by large K
- ◆ Cuboid bounding boxes generation which are composed of measurement states; position and size



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