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Object Classification in Urban Environments by Means of Machine Learning Techniques

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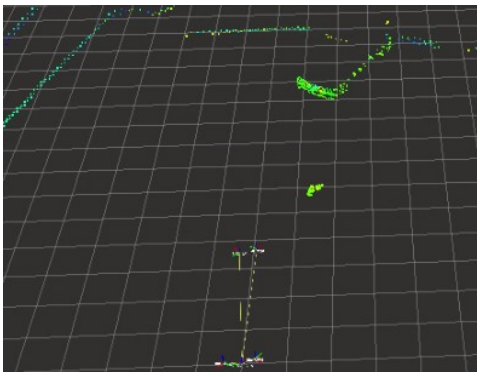

The goal of this project was to classify, by means of machine learning techniques, clusters of points extracted from a 3D point-cloud which was picked up by a series of range laser sensors installed on a vehicle. The classification was not based directly on the 3D positions of the points but on a series of features which were extracted from the clusters. The training, testing and validation data was acquired by developing simple tools to assist the manual labeling of a subsample of the data-sets collected. The manual labeling consisted in visually identifying the clusters to label as *pedestrian* and as *car*, and letting all the other clusters be classified as *other*. The reference data was then used to train a k-Nearest-Neighbors (k-NN) classification algorithm which can was able to assign a class to unknown clusters comparing them to their neighboring training data-points in the feature space.

The classification was also systematically tested in two experiments. The experiment 1 was designed to get an insight in how the classification was performing, understand the variability of the performance, the influence of the k-value and the impact of trimming down the number of training and testing clusters. The experiment 2 explored what impact the choice of the feature space in which the classification is done had on the results.

The results showed that the algorithm could perform well to identify pedestrians and cars. It however suffers from a large number of false positive errors.