Klasifikasi Benda Dalam Ruangan Dari Lidar 2D Menggunakan Metode Convolutional Neural Network

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Abstrak
The development of increasingly advanced technology has increased the need for mapping technology, such as 2D Light Detection and Ranging (LiDAR) for indoor object classification with high accuracy, allowing precise mapping of object surfaces. The main challenge of this technology is the complexity of processing new data that is difficult to recognize. Therefore, the Convolutional Neural Network (CNN) method with the AlexNet architecture is applied to overcome this problem. Alexnet has a depth of eight layers and techniques such as ReLU, dropout, and max-poolings so that it is considered capable of overcoming data complexity effectively in this study. The main objective of the study is to develop an accurate indoor object classification system that is able to adapt to various environmental conditions. The test results show that AlexNet achieves perfect accuracy with a value of 100% in recognizing objects such as swivel chairs, humans, and sofas from 100 2D LiDAR datasets with data division, namely 80 data sets for training data and 20 data sets for testing data on each label or class. The use of CNN with the Alexnet model architecture has been proven to be able to predict and recognize objects in front of it perfectly, which is reinforced by the results of the confusion matrix which shows excellent prediction capabilities, although more data is needed for more stable results. This study proves that the use of CNN in 2D LiDAR-based object classification is an effective solution in mapping object surfaces precisely and accurately.

Keywords : 2D LiDAR , Classification, CNN, Alexnet