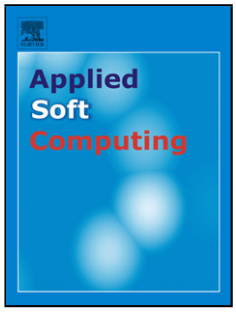

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Semi-supervised 3D Object Recognition through CNN Labeling

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Abstract

Despite the outstanding results of Convolutional Neural Networks (CNNs) in object recognition and classification, there are still some open problems to address when applying these solutions to real-world problems. Specifically, CNNs struggle to generalize under challenging scenarios, like recognizing the variability and heterogeneity of the instances of elements belonging to the same category. Some of these difficulties are directly related to the input information, 2D-based methods still show a lack of robustness against strong lighting variations, for example. In this paper, we propose to merge techniques using both 2D and 3D information to overcome these problems. Specifically, we take advantage of the spatial information in the 3D data to segment objects in the image and build an object classifier, and the classification capabilities of CNNs to semi-supervisedly label each object image for training. As the experimental results demonstrate, our model can successfully generalize for categories with high intra-class variability and outperform the accuracy of a well-known CNN model.

Keywords: Object Recognition, Deep Learning, Object Labeling, Machine Learning

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