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Increasing detection performance using redundant object detection approaches

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Abstract

Object detection is one of the key technologies to enable autonomous system to operate in a given environment. Beside static obstacles also dynamic objects like other traffic participants must be detected with high reliability. State of the art object detection is performed by artificial neural networks, trained on recorded data provided by camera and lidar sensors. Depending on the used modalities and variations, covered by the dataset, the neural network learns to recognize specific pattern and therefore to detect an object. Attempts to generalize this approach, lead to reduced performance in certain situations due to effects like forgetting. Furthermore, it can be observed that the achievable performance depends on different aspects like used modality, preprocessing, and especially environmental conditions like light and weather conditions, distance, or object structure. This work focusses on a set of specialized object detection approaches, each for a specific set of situations. Experimental results are provided to demonstrate specializability of the used neural networks in comparison. The results are analyzed with respect to complementary detections, allowing to combine a set of specialized approaches leading to an improved overall performance. A further extension will include fusion of different modalities and specifications leading to an improved general object detection.