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Deep learning applications for traffic sign detection and classification

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Advanced trends in computer vision and automotive engineering seek to control traffic conditions as much as possible to keep drivers safer, or to replace them at all. In addition to autopilot, traffic control is used in mapping, to monitor road infrastructure and its inventory, which allows controlling the functioning and maintaining the correct location of road elements. Such systems need maximum accuracy in recognizing objects of interest in real time, and this in turn imposes serious requirements on such algorithms. In this paper, an approach to road sign recognition based on the use of deep neural networks is considered. There are a large number of road elements, divided into groups, for each of which unique neural network methods and model architectures for their detection and classification are needed. This paper proposes a combination of a one shot learning YOLO neural detector pre-trained on the COCO dataset and a classification model pre-trained on ImageNet. Since there is no publicly available dataset with the large number of traffic sign classes needed to train a YOLO neural network detector, a custom labeled dataset was created. Transfer Learning was used, which reduced the time to train the models and achieved greater accuracy. The object tracking is performed by the DeepSort algorithm. The tracking mechanism allows to form a link between the frames by assigning a unique number to each detected object. The result of the pipeline can be used for further analysis. Preliminary results of the application of the proposed neural network model, trained on a dataset of real marked traffic signs are presented.

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