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SCNet: A Vehicle Color Classification Network Based on Spatial Cluster Loss and Channel Attention Mechanism

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Abstract : Vehicle color recognition plays an important role in traffic accident investigation. However, due to the influence of illumination, weather, and noise, vehicle color recognition still faces challenges. In this paper, a vehicle color classification network based on spatial cluster loss and channel attention mechanism (SCNet) is proposed for vehicle color recognition. A channel attention module is applied to extract the features of vehicle color representative regions and reduce the weight of nonrepresentative color regions in the channel. The proposed loss function, called spatial clustering loss (SC-loss), consists of two channel-specific components, such as a concentration component and a diversity component. The concentration component forces all feature channels belonging to the same class to be concentrated through the channel cluster. The diversity components impose additional constraints on the channels through the mean distance coefficient, making them mutually exclusive in spatial dimensions. In the comparison experiments, the proposed method can achieve state-of-the-art performance on the public datasets, VCD, and VeRi, which are 96.1% and 96.2%, respectively. In addition, the ablation experiment further proves that SC-loss can effectively improve the accuracy of vehicle color recognition.

Keywords : feature extraction, convolutional neural networks, intelligent transportation, vehicle color recognition
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