

Radar-Based Classification of Pedestrian and Dog Using High-Resolution Raw Range-Doppler Signatures

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Abstract : In this paper, we developed a learning framework for the classification of vulnerable road users (VRU) by their range-Doppler signatures. The frequency-modulated continuous-wave (FMCW) radar raw data is first pre-processed to obtain robust object range-Doppler maps per coherent time interval. The complex-valued range-Doppler maps captured from our outdoor measurements are further fed into a convolutional neural network (CNN) to learn the classification. This CNN has gone through a hyperparameter optimization process for improved learning. By learning VRU range-Doppler signatures, the three classes 'pedestrian', 'dog', and 'noise' are classified with an average accuracy of almost 95%. Interestingly, this classification accuracy holds for a combined longitudinal and lateral object trajectories.

Keywords : machine learning, radar, signal processing, autonomous driving

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