Accuracy Improvement of Traffic Participant Classification Using Millimeter-Wave Radar by Leveraging Simulator Based on Domain Adaptation

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Abstract : A millimeter-wave radar is the most robust against adverse environments, making it an essential environment recognition sensor for automated driving. However, the reflection signal is sparse and unstable, so it is difficult to obtain the high recognition accuracy. Deep learning provides high accuracy even for them in recognition, but requires large scale datasets with ground truth. Specially, it takes a lot of cost to annotate for a millimeter-wave radar. For the solution, utilizing a simulator that can generate an annotated huge dataset is effective. Simulation of the radar is more difficult to match with real world data than camera image, and recognition by deep learning with higher-order features using the simulator causes further deviation. We have challenged to improve the accuracy of traffic participant classification by fusing simulator and real-world data with domain adaptation technique. Experimental results with the domain adaptation network created by us show that classification accuracy can be improved even with a few real-world data.

Keywords : millimeter-wave radar, object classification, deep learning, simulation, domain adaptation

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