Scattering Centers to Point Clouds A Review of mmWave Radars for Non-Radar-Engineers

Harry D. Mafukidze; Amit K. Mishra; Jan Pidanic; Schonken W. P. Francois

Abstract:

Recently, mmWave radars have been gaining popularity, thanks to their low cost, ease of use and high-resolution sensing. In this paper, we provide a review of the mmWave radar data processing frameworks, starting from mathematical foundations to applications. Specifically, we focus on the mmWave radar point cloud as a robust data structure representing compressed signatures for target recognition and classification. We first focus on the generation of the radar point clouds, and the signal processing algorithms designed for their unique characteristics. Then, we illustrate how the radar point clouds are prepared for feature extraction and classification using machine learning and deep learning approaches. Finally, we summarize the state-of-the-art applications, open datasets, developments and future research directions in this field.