
Transmit Array Interpolation for DOA Estimation via Tensor Decomposition in 2D MIMO Radar

Abstract:

In this paper, we propose a two-dimensional (2D) joint transmit array interpolation and beamspace design for planar array mono-static multiple-input-multiple-output (MIMO) radar for direction-of-arrival (DOA) estimation via tensor modeling. Our underlying idea is to map the transmit array to a desired array and suppress the transmit power outside the spatial sector of interest. In doing so, the signal-to-noise ratio is improved at the receive array. Then, we fold the received data along each dimension into a tensorial structure and apply tensor-based methods to obtain DOA estimates. In addition, we derive a closed-form expression for DOA estimation bias caused by interpolation errors and argue for using a specially designed look-up table to compensate for the bias. The corresponding Cramér-Rao bound (CRB) is also derived. Simulation results are provided to show the performance of the proposed method and compare its performance to CRB.