Signal Processing

Volume 90, Issue 5, May 2010, Pages 1402-1414

On compressive sensing applied to radar

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https://doi.org/10.1016/j.sigpro.2009.11.009

Abstract

Compressive sensing (CS) techniques offer a framework for the detection and allocation of sparse signals with a reduced number of samples. Today, modern radar systems operate with high bandwidthsâ€”demanding high sample rates according to the Shannonâ€“Nyquist theoremâ€”and a huge number of single elements for phased array antennas. Often only a small amount of target parameters is the final output, arising the question, if CS could not be a good mean to reduce data size, complexity, weight, power consumption and costs of radar systems. There is only a small number of publications addressing the application of CS to radar, leaving several open questions. This paper addresses some aspects as a further step to CS-radar by presenting generic system architectures and implementation considerations. It is not the aim of this paper to investigate numerically efficient algorithms but to point to promising applications as well as arising problems.

Three possible applications are considered: pulse compression, radar imaging, and air space surveillance with array antennas. Some simulation results are presented and

enriched by the evaluation of real data acquired by an experimental radar system of Fraunhofer FHR.

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Keywords

Compressive sensing; Radar; Sparse arrays; Pulse compression; Radar imaging; ISAR; Airspace surveillance; DOA estimation

A mathematical introduction to compressive sensing, art uses irrefutable Genesis in good faith.
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