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IEEE Transactions on Aerospace and Electronic Systems
Special Section on Deep Learning for Radar Applications

Scope and Aims

Deep learning (DL) has garnered great interest in the radar community over the past decade, especially towards applications of automatic target recognition (ATR) in synthetic aperture radar (SAR) imagery and ground-based target recognition based on micro-Doppler signature classification. However, the unique phenomenology of radar data has presented challenges in the application of DL, including 1) training deep neural networks (DNNs) under low training sample support, a problem typical of radar applications, where it may not be possible or feasible to acquire large amounts of data corresponding to all possible antenna-target geometries or target profiles; 2) optimal (potentially high dimensional) representation of radar data to deep neural networks, as various processing steps are usually applied to convert the complex time-series to a real image-based representation or 3D data cube; and 3) development of robust DL approaches that are effective under clutter and despite RF or other sources of interference, among others. Furthermore, DL is a key enabling technology for next-generation cognitive radar systems, which aim to add intelligence to radar transceiver design and close-the-loop in the sensing process to allow for optimal performance under dynamic situations. This special section seeks submissions involving a **transformative use of DL or innovations targeted for radar applications**.

Topics of Interest include (but are not limited to):

- ❖ DL for synthetic aperture radar (SAR) imaging and automatic target recognition
- ❖ Target detection and classification in radar data
- ❖ DL for computationally efficient implementation of radar signal processing functions, including clutter suppression, time-frequency analysis and pre-processing prior to input to a DNN
- ❖ Optimal ways of presenting RF data to DNNs, e.g. point clouds, micro-Doppler, range-Doppler, range-angle, including deep learning based methods for joint-domain exploitation and fusion
- ❖ DNNs design for target recognition in challenging real-world environments, e.g. high clutter environments, where clutter bandwidth may be significant due to environmental effects, low RCS/slow-moving targets, and electronic or physical sources of interference/obstruction
- ❖ DNN design for passive, bi-static, multi-static radar or heterogeneous RF sensor networks
- ❖ DL for implementation of the perception-action cycle or other cognitive processes as part of cognitive, fully-adaptive radar design or radar resource management

Important Dates:

Submission window: Aug. 1 – Sep. 1, 2022   First review completed: Dec. 1, 2022
Revised manuscript due: Feb. 1, 2023   Second review completed: Mar. 1, 2023
Final manuscript due: Mar. 30, 2023   Publication date: 2nd quarter of 2023

Submissions will be reviewed according to standard T-AES procedures for regular papers. Prospective authors should visit *http://mc.manuscriptcentral.com/taes* for submission information. Use the category Special Section: Deep Learning for Radar Applications.

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