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IEEE Journal of Selected Topics in Signal Processing

Special Issue on Learning-Based Signal Processing for Integrated Sensing and Communications

Learning theory has seen success in speech recognition, computer vision, natural language processing and business analytics. Lately, learning and data-driven approaches are increasingly considered as key enablers for next-generation intelligent communications and radar systems. For example, to manage the design complexities, capacity, connectivity, and reliability of next-generation wireless communications, novel design methodologies are moving beyond the causal model-based signal processing to use learning paradigms leveraging on large-scale databases, full of context and information. A similar trend in seen in radar where applications of machine learning are no longer limited to merely target classification but increasingly applied to other aspects of radar design and signal processing. In this context, the recent integrated sensing and communications (ISAC) paradigm. which offers an integrated solution to spectrum sharing between the radar and communications while meeting the individual requirements, has emerged as an active applied area for learning theory and techniques. An integrated approach renders the ISAC design even more difficult because it incorporates different requirements and technical nuances of both systems. Further, rapid growth in ISAC applications brings forward an inevitable need for more intelligent processing, operation, and optimization of future systems. To realize this vision of intelligent processing and operation, there is a need to integrate learning techniques into the design, management, and optimization of ISAC systems. Modern learning techniques provide several opportunities to enable intelligent ISAC designs while addressing various problems ranging from signal processing, detection, classification, and recovery to spectrum access, channel modeling, security, resource management, waveform selection/design, deployment in new scenarios, and application/user behavior analysis. Sensing the fast-paced development of ISAC and the imminent design issues for large scaled systems, this Special Issue aims to offer the audience of *IEEE Journal of Selected Topic in Signal Processing* a compendium of latest research articles on application of learning-based signal processing for ISAC systems, hitherto not made available. Topics of interest include but are not limited to:

Learning for ISAC waveform design, channel estimation, receive processing	New learning paradigms for ISAC: deep, adversarial, tensorial, dropout, transfer learning
Learning for spectrum access, control, and optimization	Cognition, inverse cognition, metacognition for ISAC
Learning for distributed, collaborative, and multi-agent ISAC	Reinforcement learning applications for ISAC, including resource allocation
Bandit algorithms for ISAC	Quickest change detection for ISAC
Game theoretic approaches for ISAC	ISAC applications of generative models
Learning for ISAC signal classification, retrieval, and decoding	Novel optimization applications, including stochastic optimization, to facilitate learning in ISAC
Unfolding/unrolling, hybrid model-free and model-based learning for ISAC applications	Graph neural networks for ISAC applications
Active sensing for ISAC	Hardware-algorithm co-design for ISAC

In addition to technical research results, we invite high-quality submissions of a tutorial or overview nature; we also welcome creative papers outside the areas listed here but related to the overall scope of the special issue. Prospective authors can contact the Guest Editors to ascertain interest on topics that are not listed and should visit http://www.signalprocessingsociety.org/publications/periodicals/jstsp/ for information on paper submission. Manuscripts should be submitted using the Manuscript Central system at http://mc.manuscriptcentral.com/jstsp-ieee and will be peer-reviewed according to the standard IEEE process.

Important Dates

Submissions due: May 15, 2023
First review: July 31, 2023
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Second review: September 30, 2023
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