Call for Papers
IEEE Signal Processing Magazine Special Issue

Continual Learning for Evolving Signal Processing Systems: From Online Adaptation to Foundation Models

For decades, signal processing systems have adapted to changing conditions through recursive estimation, online filtering, and distributed learning algorithms. Today, the same imperative, to learn, retain, and evolve under nonstationary conditions, extends to neural networks trained on streaming data, which must incrementally acquire new capabilities without catastrophic forgetting, and to large-scale foundation models, which require continual adaptation as signal conditions, domains, and tasks evolve over time.

This Special Issue seeks tutorial, overview, and survey articles that advance a unified perspective on continual learning for signal processing—connecting adaptive filtering and recursive estimation, incremental and online learning from streaming data, and continual adaptation of foundation models—across speech, audio, vision, wireless, biomedical, and multimodal domains. We welcome contributions that bridge algorithmic foundations with system-level challenges in dynamic, resource-constrained, and long-term deployment environments.

Topics

- Foundations and theoretical bridges connecting adaptive methods, recursive estimation, online learning, and modern continual learning frameworks.
- Core challenges: stability-plasticity trade-offs, catastrophic forgetting, knowledge retention, transfer, and incremental learning formulations for nonstationary signal streams.
- Continual representation and model learning for time-frequency, sparse, graph, spatiotemporal, and multimodal signal structures.
- Signal enhancement, restoration, separation, reconstruction, localization, synthesis, and recognition in dynamic and evolving environments.
- Fine-tuning, parameter-efficient adaptation, and domain personalization of foundation models under a continual learning perspective.
- Efficient, robust, and trustworthy deployment: resource-aware learning, distributed and edge adaptation, open-world learning, privacy, uncertainty, and interpretability.
- Benchmarks, datasets, and evaluation protocols for evolving signal streams and long-term signal processing systems.

Submission Process

White papers are required, and full articles will follow only after review of the white papers. Each white paper may have up to four pages and must include the proposed title, the motivation and significance of the topic, an outline of the tutorial contribution, representative references, and an author list with contact information and short bios. All invited articles must take the form of tutorial, overview, or survey papers that address a broad audience and remain fully accessible to readers across the signal processing community, with clear relevance to the scope of the special issue. All invited papers will undergo the standard peer review process of *IEEE Signal Processing Magazine* to maintain technical quality and editorial consistency.

Important Dates

- **Mar. 1, 2027:** White papers due
- **May 1, 2027:** White-paper decision notification
- **Jul. 1, 2027:** Full-length manuscripts due
- **Sep. 1, 2027:** First reviews returned to authors
- **Nov. 1, 2027:** Revision due
- **Jan. 1, 2028:** Final decisions sent
- **Feb. 1, 2028:** Final production files due
- **May 1, 2028:** Publication date

Guest Editors

Prof. Jie Chen (Lead)
Northwestern Polytechnical University, China

Prof. Cédric Richard
Université Côte d'Azur, France

Dr. Sijia Liu
Michigan State University, US

Prof. Ali H. Sayed
EPFL, Switzerland