Editorial

We release the first issue of the fifth volume, **Digital Signal Processing and Artificial Intelligence for Automatic Learning,** with the research outlined below.

In the opening paper, "**Complexity-Aware Rate–Distortion Analysis of Classical and Neural Image Codecs,**" the authors outlined a complexity-aware evaluation framework for comparing classical and neural image codecs across diverse content regimes. They used Google Open Images Dataset (V7), and stratified approximately 125,000 images into three balanced complexity bins low, medium, and high using original file size as a proxy for spatial entropy via quantile-based thresholds. Experimental findings established content complexity as a first-order variable governing codec behaviour, indicating that current neural architectures struggle with high-frequency details compared to hand-engineered transforms.

In the following paper, "**Complexity-Invariant Rate–Distortion Gains of Transformer-Based Neural Image Codecs: A Stratified Evaluation Framework",** the authors studied the rate distortion complexity tradeoffs of modern neural image codecs, with emphasis on practical deployment in resource-constrained environments such as edge and augmented reality devices. The experimental results show that transformer-based codecs achieve approximately 44% improvement in BD rate over the hyperprior baseline, whereas autoregressive models yield approximately 30% savings. This study enabled a reproducible evaluation framework grounded in objective complexity metrics and rigorous statistical validation, offering a methodological foundation for future codec development and benchmarking.

In the final paper, "**Beyond Rate-Distortion: A Complexity-Aware Evaluation of Image Codecs Reveals INR-Based Approaches as Pareto-Optimal for Edge Deployment,"** the authors studied the conventional rate-distortion (RD) paradigm for image codec evaluation and demonstrated its inadequacy in resource-constrained, real-world deployments. The findings recommended a paradigm shift toward RDC-aware codec design and evaluation, positioning INR-based compression as a compelling solution for energy-efficient, low-latency streaming on heterogeneous edge devices without sacrificing perceptual fidelity.

We hope that the published research in this issue mark significant outcome in digital signal processing research.

Editors