Event-Driven Neuromorphic Solutions for Efficient Dynamic Signal Processing
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Abstract:

Neuromorphic computing has emerged as a promising approach to overcoming the limitations of traditional computing architectures, which are increasingly constrained by the memory bottleneck and the diminishing returns of performance scaling. By drawing inspiration from the structure and function of biological brains, neuromorphic systems, particularly those utilizing event-driven neural networks, offer a path to more efficient and adaptive computing.

Event-driven neural networks excel in on-demand processing and are uniquely suited to handle dynamic signals, such as those encountered in audio, vision, and radar systems. Unlike conventional frame-based systems that operate on fixed intervals, event-based neuromorphic systems respond asynchronously to environmental changes, enabling the real-time processing of sensory information with minimal latency and energy consumption.

This presentation will explore the fundamentals of spiking neural networks and recent advancements in their training and hardware implementations, with an emphasis on event-driven computation. The discussion will extend to practical applications, demonstrating how neuromorphic systems can advance the state-of-the-art in areas such as real-time monitoring of biomedical signal processing. Examples of prototype devices will be presented, highlighting their potential to meet the stringent energy and cost-saving demands of the Internet of Things (IoT) while enhancing performance in scenarios where timing and accuracy are paramount.