Call for Papers

Special Section on "TinyML for Empowering Low-Power IoT Edge Consumer Devices"

Theme:

The utilization of machine learning in IoT edge intelligence encompasses the implementation of machine learning algorithms and models on edge devices like sensors and controllers. This allows for instant analysis of data and decision-making without relying on cloud computing. This approach brings about numerous advantages, including decreased latency, enhanced security and privacy, and improved scalability. TinyML, on the other hand, pertains to the realm of machine learning where algorithms and models are specifically designed to operate on compact, low-power devices such as microcontrollers, sensors, and other embedded systems.

TinyML, an emerging technology, has the objective of harnessing the capabilities of machine learning in various applications, spanning from smart home devices to industrial sensors and medical implants. By executing machine learning models directly on compact devices, TinyML brings about noteworthy benefits, including real-time processing. This budding technology holds the potential to revolutionize a wide array of consumer electronics, including wearables, smart devices, and mobile devices. By leveraging edge intelligence, devices equipped with TinyML can locally process data, eliminating the need for cloud services. Consequently, TinyML presents the opportunity to substantially reduce latency, enhance privacy, and conserve energy. However, integrating TinyML into consumer electronics necessitates specialized expertise in hardware design, software development, and data management. Overcoming challenges such as limited processing power, scarce resources, data quality, hardware integration, security, and interpretability calls for specific skills in these areas.

The objective of this special issue is to capture the latest developments in tackling the challenges faced by consumer electronics within IoT networks through the utilization of TinyML-driven edge intelligence. Authors are encouraged to submit their work encompassing experimental, conceptual, and theoretical contributions that leverage TinyML techniques to address the aforementioned challenges. The special issue welcomes original experimental findings, review papers, as well as case studies.

Topics of interest in this Special Section include (but are not limited to):

- Optimizing deep learning models for energy-efficient inference on low-power devices
- Enhancing security and privacy in TinyML-powered consumer IoT devices
- Federated learning techniques for collaborative TinyML on edge devices
- Energy harvesting solutions to power TinyML devices in remote environment
- Real-time anomaly detection for predictive maintenance in consumer devices
- Edge-based transfer learning for adaptive TinyML applications
- Dynamic reconfiguration of TinyML models for varying IoT edge constraints
- Lightweight communication protocols for seamless edge-to-cloud TinyML integration
- Energy-aware compression techniques for efficient TinyML model deployment

- Edge-cloud collaborative learning for continuous model improvement in TinyML devices
- Human activity recognition using TinyML for personalized consumer IoT applications
- Minimizing TinyML model drift in edge devices through adaptive learning approaches
- TinyML-based voice assistants for natural language understanding in consumer devices
- TinyML-powered smart wearables for real-world applications
- IoT sensor data processing with TinyML models
- Interpretability and explainability of TinyML models
- Continual learning on IoT edge consumer devices

Important dates:

- Submissions Deadline: February 29, 2024
- First Reviews Due: April 30, 2024
- Revision Due: June 15, 2023
- Second Reviews Due/Notification: July 31, 2023
- Final Manuscript Due: August 31, 2024
- Tentative Publication Date: 4th quarter 2024

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Instructions for authors:

Manuscripts should be prepared following guidelines at: https://ctsoc.ieee.org/publications/ieee-transactions-on-consumer-electronics.html and must be submitted online following the IEEE Transactions on Consumer Electronics instructions: https://ctsoc.ieee.org/publications/ieee-transactions-on-consumer-electronics.html. During submission, the Special Section on "**TinyML for Empowering Low-Power IoT Edge Consumer Devices**" should be selected.