



CALL FOR PAPERS FOR SPECIAL SESSION PROPOSAL

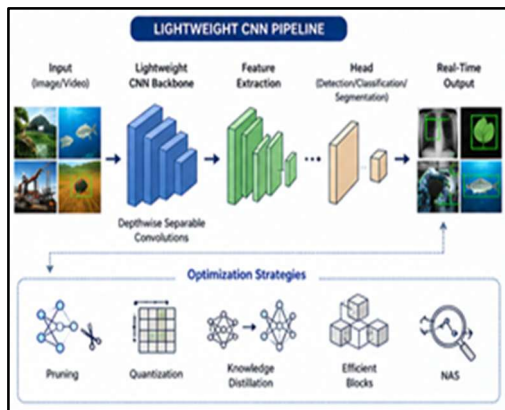
SPECIAL SESSION 11

Lightweight CNN Models for Real-Time Intelligent Systems: Advances and Applications

Session description :

The rapid evolution of artificial intelligence has led to remarkable progress in deep learning, particularly with convolutional neural networks (CNNs). However, the deployment of these models in real-world environments remains constrained by their

high computational and memory demands. This challenge has driven increasing interest in lightweight CNN models, which aim to deliver competitive performance while significantly reducing computational complexity. This special session focuses on recent advances in efficient CNN architectures designed for real-time intelligent systems, especially in resource-constrained environments such as embedded systems, edge devices, and mobile platforms. Techniques including depthwise separable convolutions, pruning, quantization, knowledge distillation, and neural architecture search (NAS) have enabled the development of compact and energy-efficient models suitable for practical deployment. The session will highlight interdisciplinary applications across several domains. In the medical field, lightweight CNNs enable real-time diagnostic support, portable imaging analysis, and AI-assisted healthcare in low-resource settings. In agriculture, they facilitate precision farming through crop monitoring, disease detection, and yield estimation using edge devices. In the industrial domain, they support intelligent inspection, defect detection, and predictive maintenance within Industry 4.0 frameworks. In underwater environments, lightweight models are crucial for object detection, marine ecosystem monitoring, and autonomous underwater navigation under challenging conditions such as low visibility and limited computational resources. Additional applications include smart cities, environmental monitoring, and surveillance systems.



Session chairs :

- Anouar BEN KHALIFA, Jendouba Univ, TN
- Hajer CHTIOUI, Sousse Univ, TN
- Fakhreddine ZAYER, Jendouba Univ, TN
- Nahla MAJDOUB BHIRI, Sousse Univ, TN

Topics of interest (not limited to) :

- Lightweight CNN architectures and design strategies
- Model compression: pruning, quantization, and knowledge distillation
- Neural Architecture Search (NAS) for efficient models.
- TinyML and ultra-lightweight deep learning models
- Hybrid lightweight models (CNN + Transformer, CNN + bio-inspired networks)
- Lightweight Vision Transformers (ViT-lite, MobileViT, EfficientFormer)
- Lightweight Graph Neural Networks (GNNs) for structured data
- CNN-GNN hybrid architectures for spatial-temporal reasoning
- Real-time object detection and image analysis
- Semantic segmentation and instance segmentation with lightweight models
- 3D vision and point cloud processing (LiDAR, RGB-D)
- Video understanding and spatio-temporal modeling
- Lightweight models for action recognition and human activity analysis
- Gesture recognition and behavior analysis
- Precision agriculture and smart farming applications
- Industrial inspection and predictive maintenance
- Underwater object detection and marine monitoring
- Energy-efficient and green AI systems
- Edge AI and embedded deep learning systems
- Deployment on IoT, mobile, and low-power devices
- Federated learning with lightweight models
- On-device learning and continual learning

Important Dates



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