IEEE TNNLS Special Issue Proposal: Advancements in Foundation Models

Synopsis:

The rapid advancements in artificial general intelligence (AGI), particularly in the domain of large language models (LLMs), large vision models (LVMs), and large multimodal foundation models (LMMs), have opened up new possibilities for transforming many aspects of scientific research, engineering, healthcare, agriculture, education, and beyond. LLMs, such as ChatGPT and its variants, have demonstrated remarkable capabilities in natural language understanding and generation tasks. Similarly, large vision models such as Segment Anything Model (SAM) and large multimodal foundation models such as GPT-4V have shown promising results in various computer vision and multimodal tasks. The applications of these foundation models in many domains have yielded encouraging performance in various types of downstream tasks. However, further research and advancements are needed to improve and validate their effectiveness, robustness, and generalizability across diverse scenarios. Despite these technical advancements, we envision that foundation models tailored for specific domains have the great potential to revolutionize how AGI can be integrated into vertical applications, ultimately generating value for various stakeholders, humanities, and our society as a whole.

In response to the fast-growing importance and research interest in foundation models, this special issue aims to explore cutting-edge research and development of foundation models and their applications in various domains. We invite original research articles, systematic reviews, and domain-specific studies that showcase the latest breakthroughs, challenges, and future directions in this emerging field of foundation models. We welcome submissions from scholars working at the intersection of artificial intelligence, machine learning, and domain applications. The special issue aims to foster cross-disciplinary collaboration and promote the development of innovative, ethically sound, and domain-specific solutions that can positively impact humanities and our society. Submissions should adhere to rigorous scientific standards, including clear problem formulation, reproducible methodology description, thorough evaluation, and meaningful interpretation of results in the context of existing literature and research practice.

Topics:

Topics of interest include, but are not limited to:
- New neural network architecture for foundation models.
- New training, fine-tuning and adaptation methods for foundation models and their applications.
- New multimodality alignment methods for foundation models.
- New reinforcement learning from human feedback methods for aligning foundation models.
- New reasoning approaches for foundation models.
- Novel methods for optimizing and accelerating foundation models and their applications.

- New frameworks for fusing and integrating multiple foundation models and their applications.
- Human factors and human-computer interactions in foundation models.
- Federated learning for foundation models and their applications in specific domains such as healthcare and finance.
- Interpretability and explainability of foundation models.
- Trustworthiness, such as ethical considerations and bias mitigation, of foundation models.
- Novel applications of foundation models in healthcare, science, engineering, agriculture, education, business, arts, humanities, and beyond.
- Evaluation metrics, open datasets, and benchmarking for foundation models.

Dates:

Manuscript submission: 15th August 2024
Preliminary decision: 15th October 2024
Revisions due: 1st January 2025
Final decision: 15th February 2025

Guest Editors:

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