Special Session: LLM-Empowered Data and Knowledge Ecosystem for Healthcare

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Organizers:

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Abstract:

The rapid evolution of Large Language Models (LLMs) opens the door to a new era of data collection, storage, and utilization. By enabling the understanding, representation, and organization of rich healthcare data at scale, LLMs facilitate deeper knowledge extraction and more insightful pattern discovery. Realizing this potential requires a robust ecosystem—one that unifies structured and unstructured data through advanced database architectures, integrates domain-specific knowledge for rigorous evaluation and real-world deployment, and upholds regulatory compliance, privacy-preserving learning, explainability, and ethical AI practices across healthcare applications.

In this special session, we aim to present a vision and explore the emerging paradigm of an LLM-Empowered Data and Knowledge Ecosystem for Healthcare, highlighting architectures, frameworks, use cases, clinical practices, and the challenges of deploying LLMs across diverse healthcare domains. We welcome contributions spanning theoretical, technical, and applied perspectives—from foundational research on aligning LLMs with medical knowledge to practical implementations in clinical settings.

Motivation and Relevance:

As the accelerating progress and emergence of powerful Large Language Models (LLMs) enables the transformation of raw information into rich, human-readable insights, there is a growing vision for their application across healthcare. These applications have the potential to revolutionize healthcare systems, spanning diagnostics, patient engagement, and recovery. At the same time, the unique properties of healthcare data—complex, multimodal, sensitive, and subject to stringent regulations—pose significant challenges to traditional healthcare data infrastructures and knowledge workflows.

This session aims to bring together interdisciplinary researchers and practitioners from AI, data science, medicine, bioinformatics, and health IT to explore how integrated ecosystems can be built in which LLMs not only access and generate insights from healthcare data but do so safely, transparently, trustworthily, and effectively.

Topics of Interest (include but are not limited to):

- Architectures for LLM-integrated healthcare data platforms
- Fine-tuning and adapting LLMs for clinical and biomedical domains
- Knowledge representation and reasoning in LLM-powered systems
- Multimodal LLMs for combining text, imaging, sensor, and genomic data
- LLMs for evidence-based medicine and clinical decision support
- Privacy-preserving and federated learning with LLMs
- Explainability, bias mitigation, and safety in LLM applications
- LLMs for patient engagement, education, and conversational agents
- Evaluation metrics and benchmarks for healthcare-specific LLMs
- Case studies of LLM deployment in hospitals, research, and telemedicine
- Regulatory and ethical considerations in LLM-driven healthcare systems

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Expected Impact:

This special session will provide a critical forum for advancing the discourse on how to build an LLM-centered healthcare ecosystem that is not only technically sound but also ethically aligned and practically useful. By highlighting real-world deployments, novel research, and visionary approaches, the session will catalyze collaboration across disciplines and pave the way for next-generation intelligent healthcare solutions.

Target Audience:

- Researchers in AI, NLP, and machine learning
- Healthcare informaticians and data scientists
- Medical practitioners and clinical researchers
- Bioinformaticians and systems biologists
- Health IT professionals and software developers
- Policy-makers and ethics researchers in healthcare AI

Format:

The session will include a combination of:

- 4-5 invited keynote talks from leading experts
- A panel discussion on future challenges and directions