

CAIT2026 Special Session XV

Special Session Basic Information:

Session Title	中文：人工智能智能体和数字孪生在医疗和健康领域应用 英文：The application of AI agents and digital twins in medical and healthcare
Introduction and topics	
中文： 人工智能（AI）正在通过显著提高诊断准确性、实现个性化治疗方案，深刻改变医疗与健康领域。借助自主 AI 智能体和数字孪生等技术，医疗保健正朝着高度预测性和主动性的模式转变。数字孪生——即患者或生物系统的虚拟副本——使临床医生能够在进行实际物理干预之前，模拟治疗过程并预测临床结果。与此同时，AI 智能体能够分析海量的非结构化医疗数据（如临床记录），从而提供精确、可操作的见解，并执行复杂的临床工作流程。这些技术进步不仅改善了患者的治疗效果，还优化了医疗服务的交付流程，使其更加高效并降低了总体成本。智能体和数字孪生技术正日益被整合到从持续健康监测到动态电子病历管理的各类应用中，提供精确的实时洞察，积极支持临床决策。随着这些技术的不断发展，它们为精准医疗和改善患者护理带来了前所未有的机遇。AI 智能体可以自主促进医患沟通并提供实时的决策支持，而数字孪生则能提供持续的、个性化的健康模拟。然而，这些进步也带来了独特的伦理和落地实施挑战。确保公平获取先进的 AI 智能体和数字孪生技术，同时妥善解决数据隐私问题，是充分发挥其潜力的关键。此外，将自主智能体整合到现有的医疗系统中，需要仔细考量安全性、问责制和有效性，以在医疗服务提供者和患者之间建立信任。科学家、临床医生和政策制定者之间持续的研究与合作，对于克服这些挑战、确保智能体驱动和数字孪生解决方案成为有益的医疗工具至关重要。通过解决这些问题，人工智能将真正重塑医疗保健的未来，使其更具响应性、个性化和普及性。 Artificial Intelligence (AI) is transforming the medical and healthcare sectors by significantly enhancing diagnostic accuracy and personalizing treatment plans. Through technologies like autonomous AI agents and digital twins, healthcare is shifting toward highly predictive and proactive models. Digital twins—virtual replicas of patients or biological systems—enable clinicians to simulate treatments and anticipate outcomes before physical interventions. Concurrently, AI agents can analyze vast amounts of unstructured medical data, such as clinical notes, to provide precise, actionable insights and execute complex clinical workflows. These advancements not only improve patient outcomes but also streamline healthcare delivery, making it more efficient and reducing overall costs. Intelligent agents and digital twin technologies are being increasingly integrated into various applications, from continuous health monitoring to dynamic electronic record management, offering precise, real-time insights that actively support clinical decision-making. As these technologies evolve, they present unprecedented opportunities for precision medicine and improved patient care. AI agents can autonomously facilitate patient communication and provide real-time decision support, while digital twins offer continuous, personalized health simulations. However, these advancements also bring forth unique ethical and implementation challenges. Ensuring equitable access to advanced AI agents and digital twins, while effectively addressing data privacy concerns, is critical to harnessing their full potential. Additionally, integrating autonomous agents into existing healthcare systems requires careful consideration of safety, accountability, and efficacy to build trust among providers and patients alike. Ongoing research and collaboration among scientists, clinicians, and policymakers are essential to overcoming these challenges and ensuring that agent-driven and digital twin solutions serve as beneficial tools. By addressing these concerns, AI can truly reshape healthcare, making it more responsive, personalized, and accessible.	

Special Session Chair(s):

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Organizer’s Brief Biography

曹世华，男，博士，香港中文大学博士后，教授，正高级工程师，美国北德州大学访问学者，杭州师范大学硕士生导师，荷兰马斯特里赫特大学（Maastricht University）兼职博士生导师，在中国多个医疗信息化和护理学会协会担任副会长、理事等职务。主持了国家十一五科技支撑计划等 20 多项医疗健康信息化科研课题，在 npj digital medicine、Artificial Intelligence in Medicine 等权威期刊和会议上发表学术论文 100 多篇，入选全球 ESI 高被引论文 2 篇，拥有美日澳和中国等专利 50 项，获得中国发明协会二等奖、日内瓦国际发明展银奖等 20 多项奖项。研究领域为：人工智能辅助认知障碍筛查和辅助诊断、AD 数字生物标记物、人工智能慢病监测和管理、护理信息化、数字健康。

Shihua Cao, male, Ph.D., Postdoctoral Fellow at The Chinese University of Hong Kong, Professor and Senior Engineer. Visiting Scholar at the University of North Texas, Master's Supervisor at Hangzhou Normal University, and Adjunct Doctoral Supervisor at Maastricht University, the Netherlands. He serves as Vice President and Council Member in multiple medical informatics and nursing societies and associations in China. He has led more than 20 research projects in medical and health informatics, including the National Eleventh Five- Year Science and Technology Support Program. He has published over 100 academic papers in prestigious journals and conferences such as npj Digital Medicine and Artificial Intelligence in Medicine, with two papers selected as ESI Highly Cited Papers. He holds 50 patents, including those from the United States, Japan, Australia, and China. He has received more than 20 awards, including the Second Prize of the China Invention Association and the Silver Medal at the International Exhibition of Inventions of Geneva. His research interests include AI- assisted cognitive impairment screening and auxiliary diagnosis, digital biomarkers for Alzheimer's disease, AI-based chronic disease monitoring and management, nursing informatics, and digital health.

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Organizer’s Brief Biography

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邓宁博士于 2007 年在浙江大学获得生物医学工程博士学位，现任浙江大学生物医学工程与仪器科学学院副教授、博士生导师。2007 年至 2010 年间，他曾任美国加州大学洛杉矶分校（UCLA）助理研究员。近年来，邓教授已发表论文 50 余篇，建立了慢性阻塞性肺疾病、高血压和糖尿病的数字化闭环管理路径，开发了居家呼吸康复的智能技术与应用系统，在中国共建设了 17 个慢性病管理示范应用项目。其关键技术已获国家卫生健康委员会及欧盟 “ICare4EU” 工作组的认可和采纳。

Ning Deng, College of Biomedical Engineering and Instrument Science, Zhejiang University, Hangzhou, China.
Dr. Ning Deng received his PhD degree in Biomedical Engineering from Zhejiang University in 2007. He is currently an associate professor and PhD Supervisor at the College of Biomedical Engineering and Instrument Science, Zhejiang University. He was an assistant researcher at University of California, Los Angeles from 2007 to 2010. In recent year, Prof. Deng has published more than 50 papers, established a digital closed-loop management path for chronic obstructive pulmonary disease, hypertension and diabetes, developed intelligent technologies and application systems for home-based respiratory rehabilitation, built a total of 17 demonstrated application for chronic disease management in China. Key technologies have been recognized and adopted by the National Health Commission and the “ICare4EU” Working Group from EU.