

CAIT2026 Special Session XIII

Special Session Basic Information:

Session Title

中文：具泛化能力且可信的生物特征识别
英文：Generalizable and Trustworthy Biometrics

Introduction and topics

中文：

生物特征识别已成为身份认证、访问控制、公共安全、人机交互和智能服务等领域的重要支撑技术。近年来，深度学习和基础模型的快速发展显著提升了人脸、指纹、虹膜、掌纹、步态、语音以及行为生物特征等多种模态的识别性能。然而，生物特征识别技术在真实场景中的应用仍面临诸多挑战，例如姿态、光照、年龄、表情、遮挡、传感设备以及采集环境的变化。此外，大规模、开放集和开放世界识别还进一步带来了计算效率、领域泛化、模型鲁棒性与可靠决策等方面的问题。

与此同时，生物特征信息的广泛采集与应用也引发了人们对隐私、安全、公平性及潜在滥用风险的高度关注。现有生物特征识别系统可能受到呈现攻击、对抗性攻击、深度伪造身份攻击以及生物特征模板泄露等安全威胁。此外，不同人口群体之间存在的性能差异也可能削弱系统的可靠性、公平性和社会可接受性。因此，未来的生物特征识别技术不仅需要追求更高的识别精度，还应同时具备良好的鲁棒性、泛化能力、安全性、公平性、隐私保护能力和计算效率。

本专题旨在汇聚来自生物特征识别、计算机视觉、模式识别、机器学习、信号处理和网络安全等领域的研究人员与行业专家，共同交流可信且具泛化能力的生物特征识别领域的最新研究进展。本专题欢迎理论研究与应用研究成果，包括新型生物特征表征方法与学习目标、多模态融合策略、大规模可扩展识别方法、隐私保护技术、攻击检测与防御方法、评测协议与数据集，以及生物特征识别技术在真实场景中的创新应用。通过本专题，我们希望促进不同研究领域之间的交叉融合与深入交流，探索下一代生物特征识别系统的发展方向，推动生物特征识别技术实现更加安全、可靠、公平且负责任的实际部署。

征稿主题包括但不限于：

- 人脸、指纹、虹膜、掌纹、步态、语音及行为生物特征识别
- 多模态生物特征识别与跨模态生物特征融合
- 大规模、开放集与开放世界生物特征识别
- 非受限及低质量条件下的生物特征识别
- 跨域、跨设备与跨光谱生物特征识别
- 面向生物特征识别的领域适应与领域泛化
- 面向生物特征识别的少样本、零样本、自监督与持续学习
- 基础模型和视觉语言模型在生物特征识别中的应用
- 高效生物特征识别模型、可扩展学习与边缘部署
- 生物特征识别中的长尾学习与类别不平衡问题
- 鲁棒的生物特征表征与学习目标
- 呈现攻击检测与生物特征防伪
- 深度伪造检测与身份操纵分析
- 生物特征识别系统的对抗攻击与防御
- 生物特征模板保护与可撤销生物特征识别
- 隐私保护、联邦学习与分布式生物特征学习
- 生物特征识别中的公平性、偏差缓解、可解释性与问责机制
- 合成生物特征数据的生成与数据增强
- 生物特征质量评估与不确定性估计

- 新型生物特征数据集、基准与评测协议
- 生物特征识别的新兴应用与负责的实际部署

英文:

Biometric recognition has become a fundamental enabling technology for identity authentication, access control, public security, human–computer interaction, and intelligent services. Recent advances in deep learning and foundation models have substantially improved the performance of biometric systems across a wide range of modalities, including face, fingerprint, iris, palmprint, gait, voice, and behavioral biometrics. Nevertheless, deploying biometric technologies in real-world environments remains challenging because of variations in pose, illumination, age, expression, occlusion, sensing devices, and acquisition conditions. Large-scale and open-set recognition further introduces difficulties related to computational efficiency, domain generalization, model robustness, and reliable decision-making.

Meanwhile, the growing use of biometric information has raised significant concerns regarding privacy, security, fairness, and potential misuse. Biometric systems are vulnerable to presentation attacks, adversarial manipulation, deepfake-based identity attacks, and template leakage. Performance disparities across demographic groups may also undermine the reliability and social acceptability of these systems. Therefore, future biometric technologies must provide not only high recognition accuracy but also strong robustness, generalization, security, fairness, privacy protection, and computational efficiency.

This special session aims to bring together researchers and practitioners from biometrics, computer vision, pattern recognition, machine learning, signal processing, and cybersecurity to present recent advances in generalizable and trustworthy biometric recognition. The session welcomes both theoretical and application-oriented studies, including new biometric representations, learning objectives, multimodal fusion strategies, scalable recognition methods, privacy-preserving techniques, attack detection and defense, evaluation protocols, datasets, and real-world biometric applications. Through this session, we hope to promote interdisciplinary discussion and identify promising directions for the development and responsible deployment of next-generation biometric systems.

Topics of interest include, but are not limited to:

- Face, fingerprint, iris, palmprint, gait, voice, and behavioral biometric recognition
- Multimodal biometrics and cross-modal biometric fusion
- Large-scale, open-set, and open-world biometric recognition
- Biometric recognition under unconstrained and low-quality conditions
- Cross-domain, cross-device, and cross-spectral biometric recognition
- Domain adaptation and domain generalization for biometrics
- Few-shot, zero-shot, self-supervised, and continual learning for biometrics
- Foundation models and vision-language models for biometric applications
- Efficient biometric models, scalable learning, and edge deployment
- Long-tailed learning and class-imbalance problems in biometric recognition
- Robust biometric representations and learning objectives
- Presentation attack detection and biometric anti-spoofing
- Deepfake detection and identity manipulation analysis
- Adversarial attacks and defenses for biometric systems
- Biometric template protection and cancelable biometrics
- Privacy-preserving, federated, and distributed biometric learning
- Fairness, bias mitigation, explainability, and accountability in biometrics
- Synthetic biometric data generation and augmentation
- Biometric quality assessment and uncertainty estimation
- New biometric datasets, benchmarks, and evaluation protocols
- Emerging biometric applications and responsible real-world deployment

Special Session Chair(s):

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Organizer's Brief Biography

中文：

龚雪沅现任中国珠海暨南大学智能科学与工程学院讲师，入选暨南大学青年人才支持计划和“双百英才计划”。他于2019年获得澳门大学计算机科学博士学位。其主要研究方向包括模式识别、生物特征识别和深度学习，重点关注人脸识别、深度神经网络及损失函数。目前，他主持三项科研项目，并已在 *TCSVT*、*Information Fusion*、*TBIOM*、*AAAI26*、*Neural Networks*、*ESWA* 和 *Information Sciences* 等国际期刊及会议上发表论文 20 余篇。他还担任 *TIP*、*AAAI26*、*TCE*、*Pattern Recognition*、*Applied Soft Computing*、*ESWA* 和 *Neurocomputing* 等期刊及会议的审稿人，曾担任 CAIT 2024、CAIT 2025 和 CINT 2025 的专题主席，并担任 JBHI 某专题特刊的客座编辑。

英文：

Xueyuan Gong is currently an Assistant Professor at the School of Intelligent Systems Science and Engineering, Jinan University (Zhuhai Campus), Zhuhai, China. He is a recipient of the Jinan University's *Young Talent Support Project* and the *Two Hundreds Talent Program*. He received his Ph.D. in Computer Sciences from the University of Macau in 2019. His research interests lie in Pattern Recognition, Biometrics, and Deep Learning, with a particular focus on Face Recognition, Deep Neural Networks, and Loss Functions. He currently serves as the Principal Investigator (PI) of three research projects and has published over 20 papers in journals/conferences such as *TCSVT*, *Information Fusion*, *TBIOM*, *AAAI26*, *Neural Networks*, *ESWA*, *Information Sciences*, etc. He also serves as a reviewer for *TIP*, *AAAI26*, *TCE*, *Pattern Recognition*, *Applied Soft Computing*, *ESWA*, *Neurocomputing*, etc. He is a Track Chair for *CAIT2025*, *CINT2025*, *CAIT2024*, and a Guest Editor for a special issue of *JBHI*.