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EDITORIAL

Guest editorial: special issue on pedestrian attribute recognition and person re-identification

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1 Introduction

Pedestrian attributes recognition and person re-identification from images and videos are nowadays relevant problems in several real-world applications, such as forensics, digital signage, social robotics, business intelligence, people tracking and multi-camera person re-identification. This Special Issue of *Pattern Analysis and Applications* brings together a collection of high-quality original research contributions that address the challenges of pedestrian attribute recognition and person re-identification and their applications in surveillance, human behavior understanding, autonomous systems, and privacy-conscious environments.

Following a rigorous blind review process, 13 high-quality articles were selected from 32 submissions, reflecting a 40.6% acceptance rate. This selection underscores both the competitiveness and the high scientific standards upheld throughout the editorial process.

The accepted works represent a broad and comprehensive exploration of the field, encompassing topics such as person re-identification, pose estimation, human image synthesis, people detection, gait recognition, pedestrian intention estimation, and person trajectory prediction. Collectively, these contributions highlight the current trends, ongoing challenges, and innovative solutions in pedestrian attribute recognition and person re-identification. Across the accepted papers, several emerging themes and innovations stand out, such as robust re-identification under challenging conditions, lightweight and efficient models for pose estimation and tracking, high-fidelity human image synthesis, privacy-preserving vision systems and behavioral understanding through gait and intention modeling.

2 Identifying the author contributions

Advancements in pedestrian attribute recognition and person re-identification are essential for enabling intelligent surveillance, people behavior understanding, and robust biometric analysis in complex real-world scenarios.

Central to these efforts is improving how individuals are identified across varying viewpoints, occlusions, and environmental challenges; this aspect is extensively covered in the special issue. Zhou et al. introduce MPCC-Net, a three-part framework combining multi-state fused backbones, perception consistency constraints, and partition attention modules to address pose and scale variations across cameras. By reinforcing feature stability and enhancing part-level discrimination, this method elevates the robustness of cross-camera person re-identification. In a complementary direction, Ahmed et al. propose a multi-task learning architecture that jointly predicts person identity and attributes such as age, gender, and clothing. Their shared-backbone design, enhanced by attribute-specific heads and generalized mean pooling, allows to obtain holistic and semantically enriched representations. Focusing on occlusion and clothing variability, Nguyen et al. present a plug-and-play occlusion-aware framework featuring OASL, a dual-stream model for shape and appearance analysis, and introduce E-PRCC, the first dataset specifically targeting Occluded Cloth-Changing Re-ID. Arain et al. leverage Swin Transformers in their SwinReID model, able to capture long-range dependencies and fine spatial features, further enhanced with a channel attention mechanism for robustness under appearance

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changes. Ye et al. propose a visibility-aware approach that reconstructs occluded features using neighboring visible regions guided by keypoint detection, contributing a novel feature substitution strategy that improves person re-identification performance under partial occlusions.

Another aspect that is critical for interpreting pedestrian behavior and improving people tracking is the recognition of human pose, especially under visual clutter or occlusions. To this end, Tian et al. propose PCDPose, a lightweight Vision Transformer model that introduces a pose-enhancing attention module and various context broadcasting modules. These design choices emphasize relevant foreground regions and infer occluded joints by propagating contextual signals across vision tokens. On the other hand, Zheng et al. focus on efficiency with Ghost-HRNet, which integrates ghost modules and CBAM into a multi-scale HRNet structure. The result is a compact lightweight architecture able to achieve high accuracy in human pose estimation on constrained devices.

Understanding human appearance and motion also requires realistic visual synthesis across varied poses and scenes. To this aim, Wei et al. propose HPT-GAN, a pose-guided image generation method that overcomes texture distortion and misalignment by incorporating a texture transfer module using multi-head attention, residual blocks for gradient stability, and a module for multi-resolution fusion. This design achieves high-quality human image synthesis using a neural network with fewer parameters and faster inference compared to similar approaches.

As privacy becomes a growing concern in visual recognition systems, protecting identity during detection is imperative. Addressing this, Knapik et al. propose a privacy-preserving people detection system that operates directly on encrypted images. Their framework introduces a learnable perceptual encryption scheme, hierarchical image scrambling, and a modified YOLO detector with custom input layers and a Lipschitz cost function, making it one of the first methods capable of accurate detection under full image encryption.

Behavioral biometrics such as gait provide valuable cues for identity recognition in unconstrained environments; moreover, gait recognition is used in various video analysis applications for digital health. Yaprak et al. enhance part-based gait recognition by segmenting the standard gait energy images into five horizontal regions and applying ensemble learning and meta-models for part-specific feature refinement. A novel part-removal strategy further improves robustness by mitigating appearance-induced variability, offering a discriminative and adaptable gait representation.

Finally, understanding pedestrian intention and predicting future movement are crucial for safety and interaction in human-aware systems, including autonomous vehicles and smart surveillance. Scaccia et al. present UnPIE, an unsupervised framework that uses spatio-temporal graph convolutional networks to extract intention-aware embeddings from unlabeled video, forming behavior-driven clusters in latent space. Bouzayane et al. propose FORT-RAJ, a hybrid model for real-time trajectory prediction in fisheye imagery, combining fisheye-adapted tracking (FORT) with graph-attention prediction (GATraj) to overcome the optical challenges of wide-angle views. Dang et al. address real-time multi-camera tracking under hardware constraints with a distributed system using lightweight edge detection, server-side Re-ID with ByteTrack, and efficient stream management through Kafka, achieving accurate tracking in crowded environments with limited resources.

3 Summary and conclusions

The 13 papers published in the Special Issue illustrate the diverse range of issues and provide a detailed compilation of the topics currently being investigated in the field of pedestrian attribute recognition and person re-identification research.

This Special Issue makes a significant contribution to these research topics by presenting solutions that are both methodologically innovative and highly applicable. The works advance the state of the art across the full visual recognition pipeline, from human pose estimation and re-identification, to gait analysis, trajectory prediction, image synthesis, and privacy-preserving detection. By introducing new datasets, efficient architectures, and integrated frameworks, the Special Issue not only deepens academic understanding but also provides a strong foundation for real-world implementation.

We believe these contributions may shape future directions in pedestrian attribute recognition and person re-identification, encouraging interdisciplinary collaboration and innovation at the intersection of computer vision and human behavior analysis.

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