

CarGait: Enhancing Gait Recognition Through Cross-Attention Re-ranking

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Gait recognition (GR) enables identifying individuals based on their walking patterns from a distance. It is highly valuable for a wide range of applications, from surveillance and identification to prevention and health diagnostics. However, in practical deployment scenarios, identification performance often degrades due to viewpoint changes, occlusions, and low resolution.

Most GR approaches rely on a single-stage retrieval process, where candidates are encoded once and ranked according to their similarity to a probe gait sequence. In this work, we introduce **CarGait**, a novel re-ranking method designed to significantly improve single-stage gait recognition performance. Instead of relying solely on initial retrieval results, CarGait refines them using a cross-attention mechanism that captures subtle relationships between the probe and its top-K candidate samples. This enables better differentiation between individuals with similar gait patterns and helps recover correct matches that would otherwise be missed. By leveraging contextual cues and pairwise relationships, CarGait consistently improves identification accuracy without requiring additional training data or significant computational overhead.

We demonstrate the effectiveness of our approach across multiple gait recognition benchmarks and models, showing clear improvements over both baseline methods and existing re-ranking techniques.

This work advances gait recognition toward real-world deployment, highlighting the value of re-ranking as a simple yet powerful component in modern GR systems, and pointing to its potential for future applications in fine-grained human action analysis.