Gait Anonymization Using Deep Learning

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Motivation

Social internet users can upload and share the videos easily
People in videos may be recognized by gait recognition systems because:
- Gait has become a type of personal ID
- Gait can be recognized from a distance

Posting videos increases the risk of privacy invasion

Objective

Anonymizing gaits:
- The anonymized gaits cannot be recognized by the gait recognition systems
- The anonymized gaits still maintain the naturalness (shape, color, movement)

Methodology

Training phase

Generation phase

Pre-processing: Extracting the contour of the silhouettes from the input video
Noise Generator G噪: Generating the noise in gait distribution from the random noise
Discriminators: Two discriminators D_S and D_T are to distinguish the real gait and generated gait in spatial and temporal domain
Gait Generator G: Generating the anonymized gait from original gait and the noise
Loss function to train generator G L(G)=L_{Rec}(G)+\alpha*L_{Dent}(G)+L_{G}(G)+L_{r}(G)

Post-Processing: Colorizing the anonymized gait with the color of the original gait

Evaluation two metrics:
- Naturalness: Using MOS test
- Success rate: The rate that the recognition system fails to recognize the anonymized gait.
  Two system are used: [S. Zheng et al. 2011], [Wu et al. 2018]
- Baseline: [Tieu et al. 2017]

Impact of \( \alpha \):

Results

When \( \alpha \) increases, the naturalness trends to decreases and the success rate increases