MimicGait: A Model Agnostic approach for Occluded Gait Recognition using Correlational Knowledge Distillation

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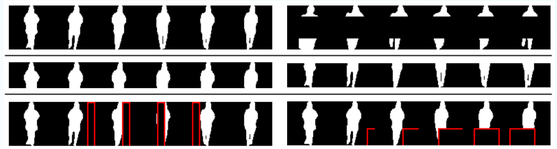
Introduction

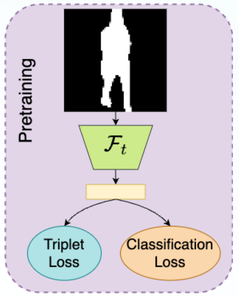
- Gait Recognition aims to identify people based on how they walk, even in the presence of occlusions

We propose
- A **model-agnostic** approach for occluded gait recognition
- A **multi-instance correlational distillation loss** for learning correlations among occluded and complete body
- A **novel metric 'RP'** for model-agnostic evaluation

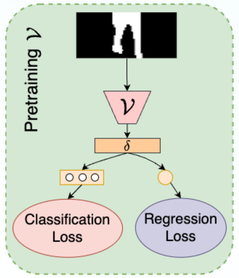
- We use synthetic occlusions in this work



Pretraining – Teacher and Visibility Estimation Network

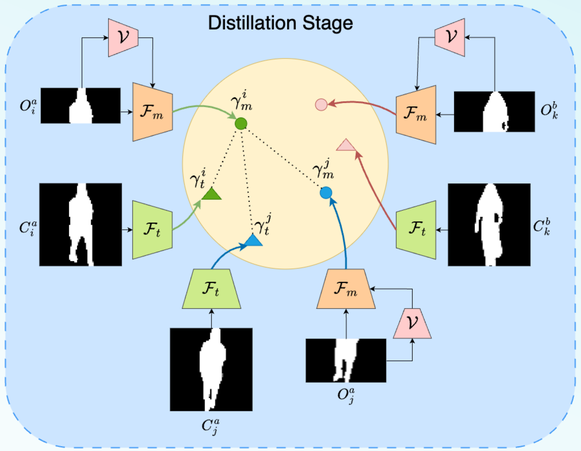


- Teacher Network trained to generate 'ideal' features from holistic (non-occluded) data
- Mimic network will later try to mimic these ideal features



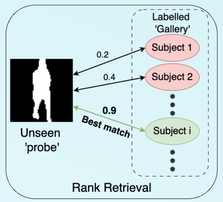
- A **Visibility Estimation Network (VEN)** learns to classify occlusion types and predict the occlusion amount
- This occlusion-relevant information is used to **assist the mimic network**

Methodology



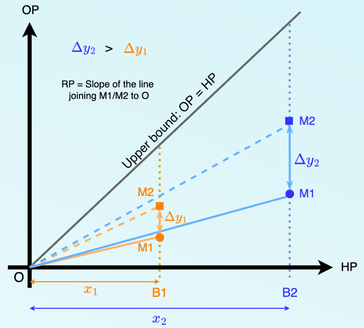
- Mimic network tries to generate ideal features from occluded input
- Gets assistance from VEN – occlusion relevant information
- Positives sampled from multiple instances, with different occlusions – **multi-instance correlational distillation loss**

Evaluation Metrics

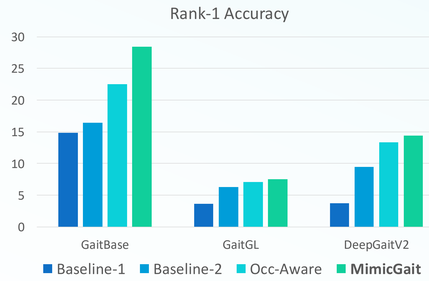


- **Rank Retrieval Accuracy**: Proportion of times the predicted match is the real ground truth match
- Depends on difficulty of dataset, strength of backbone, strength of occlusion-mitigating method and other factors

- **Relative Performance (RP)** normalizes occluded performance with its upper bound
- Change in slope of OP vs HP is a better metric to evaluate on occlusions, robust to factors like backbone architecture

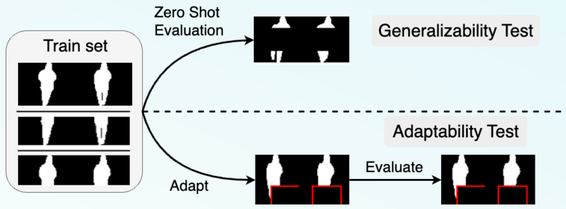


Results

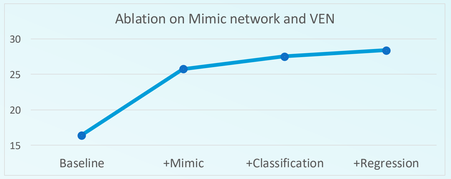


- Our model-agnostic approach works with multiple gait recognition backbones
- Our method improves performance over other occlusion mitigating methods
- Interestingly, the more advanced DeepGaitV2 performs worse than the simple GaitBase on occluded data!

Additional Evaluation and Ablations



- We propose new tests to evaluate different aspects of the model
- Evaluate performance on new occlusion types
- MimicGait outperforms other models on both these tests



- The mimic training strategy increases performance compared to the baseline – the original backbone
- The two proxy tasks of the Visibility Estimation Network (VEN) also contribute to the performance individually

ayush-00.github.io/mimicgait-website

Scan QR code for the project website, paper, code and more!

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