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Wanrong (Zoey) Zheng

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Education

University of Southern California, Master of Science in Computer Science — *Aug. 2020 — May. 2023*
- Advisor: Prof. Ram Nevatia & Prof. Laurent Itti

South University of Science and Technology of China, Exchange in Computer Science — *Jan. 2021 — Jun. 2021*

Anhui University, Bachelor of Science in Computer Science, GPA: 89.07/100, top 6% — *Sep. 2014 — Jun. 2018*

Research Interests

- Person Re-Identification [1, 2, 4]: retrieving the same individual based on the human pose, gait, and face information.
- 3D vision [2]: representing and reconstructing 3-D dynamic human shape and pose.
- Explainable Artificial Intelligence [3]: transparent and effective human-in-the-loop learning.
- Face Recognition: high performance large scale Face Recognition task with real-world multi-race data.

Publications

1. **Wanrong Zheng**, Haidong Zhu, Zhaoheng Zheng, and Ram Nevatia. **GaitRef: Gait Recognition with Refined Sequential Skeletons**. *Under review* (2023).
2. Haidong Zhu, **Wanrong Zheng**, Zhaoheng Zheng, and Ram Nevatia. **CAT-NeRF: Constancy-Aware Tx^{2}Former for Dynamic Body Modeling**. *Under review* (2023).
3. Yunhao Ge, **Wanrong Zheng***, Xingrui Wang*, Di Wu*, Yao Xiao, Xu Zhi, and Laurent Itti. **Towards Generic Interface to Human-Neural Network Knowledge Exchange**. *Under review* (2023).
4. Xiaoke Jiang, Yu Qiao, Junjie Yan, Qichen Li, **Wanrong Zheng**, and Dapeng Chen. **SSN3D: Self-Separated Network to Align Parts for 3D Convolution in Video Person Re-Identification**. *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI'21).* [paper].

Awards & Honors

1st on MS1M dataset in Masked Face Recognition Challenge (**ICCV 2021**) out of 136 teams — *Oct. 2021*
2nd on Glint360k dataset in Masked Face Recognition Challenge (**ICCV 2021**) out of 86 teams — *Oct. 2021*
National Endeavor Scholarship for Top Undergraduate Students of China (top 1%) — *Nov. 2017*

Research Experience

IRIS Computer Vision Lab, University of Southern California — **Los Angeles, CA**
Research Assistant, Advisor: Prof. Ram Nevatia — *Jan. 2022 — Present*

- **GaitRef: Gait Recognition with Refined Sequential Skeletons Knowledge Exchange**
  - Combined the silhouettes and skeletons information and refined the framewise joint predictions for gait recognition.
  - Utilized temporal information from silhouette sequences for refining the skeletons, without extra annotations, the refined skeletons achieved state-of-the-art gait recognition performance without extra annotations.
  - On Gait3D, the proposed method outperformed the baseline by 6.1% on Rank-1 and 5.4% on Rank-5.
  - Submitted one primary-author paper to CVPR 2023 [1].
- **CAT-NeRF: Constancy-Aware Tx^{2}Former for Dynamic Body Modeling**
  - Proposed a novel structure to combine two Transformer layers for reconstructing dynamic body shapes, which separated appearance constancy and uniqueness of videos.
  - Achieved a 30.3% PSNR relative improvement on H36M, compared with the SOTA baseline method.
  - Submitted one second-author paper to CVPR 2023 [2].

iLab, University of Southern California — **Los Angeles, CA**
Research Assistant, Advisor: Prof. Laurent Itti — *Jan. 2022 — Present*

- **Towards Generic Interface to Human-Neural Network Knowledge Exchange**
  - Proposed a pipeline for humans to directly interact with Neural Networks on a structural representation of visual concepts.
  - Constructed Structural Concept Graphs (SCG), which is a reasoning logic mechanism of Neural Networks in classification tasks by utilizing reasonable concepts extractor and Graph reasoning Network.
  - Humans could make decisions on the SCG and use SCG to guide the original Neural Network backward by knowledge distillation.
  - Accuracy increased by about 4% improvement on target ImageNet classes without a drop on the other classes.
  - Submitted one second-author paper to Nature Machine Intelligence [3].

Identity Verification, SenseTime **Shenzhen, China**
Research Engineer, Advisor: Dr. Yichao Wu & Mr. Ding Liang *Jan. 2021 — Aug. 2021*

- **Phone Unlock Facial Verification**
  - Built a multi-race and multi-factor (hat, glasses, makeup) testset as the evaluation testset to promote granularity of evaluation result.
  - Implemented different image preprocessing approaches and found out the best crop and align way for phone recognition scene.
  - Applied feature ensemble, Adaptation training, and hard data mining to enhance performance on a weak domain while keeping accuracy on others.
  - Achieved 1e-6FAR@recall 87.65% (increased by 7.41%) on African race subset.
- **Knowledge Distillation Optimization**
  - Proposed a novel loss to evaluate knowledge distillation, which used the student network to reconstruct the teacher's hidden layer.
  - Calculated the Normalized L2 Loss between the teacher hidden layer and student hidden layer as knowledge distillation loss.
  - The 1e-5FAR@recall increased by 2.93% on Chinese Face Unlock.

Smart City Group, SenseTime **Shenzhen, China**
Research Engineer, Advisor: Dr. Xiaoke Jiang & Dr. Junjie Yan *Dec. 2019 — Dec. 2020*

- **Self-Separated Network to Align Parts for 3D Convolution in Video Person Re-Identification**
  - Trained the Self-Separated Network in supervised / semi-supervised / unsupervised ways, which proved the efficiency of the semi-supervised alignment strategies, which used the labels with the selected position.
  - Designed and visualized on both synthetic and real data to show that selected labels helped the attention classifiers to pay attention to the desired parts and had the ability to adjust mistaken pose estimation.
  - Received a 15.5% Rank-1 improvement on iLIDS compared to the fully supervised way.
  - Published one paper on AAAI 2021 [4].
- **A Spatial-Temporal Model to Aid Subway Face Verification With Mask**
  - Collected a dataset from a running face verification system for subway stops, which showed 91% of error records were with masks.
  - Leveraged the spatial-temporal pattern of humans to aid the masked face verification at the subway entrance.
  - Modeled the behavior of passengers from their history of riding data and computed a joint verification score by combining the spatial-temporal score and visual score.
  - The presented spatial-temporal pattern could be used to aid the verification which avoided 15.9% of real-world hard cases.

Work

SenseTime Research **Shenzhen, China**
Algorithm Development Engineer, Advisor: Dr. Yichao Wu & Dr. Xiaoke Jiang *Sep. 2019 — Aug. 2021*

- Responsible for supplying face unlock models for major Chinese mobile phone manufacturers.
- Prepared three different size levels of models for various products' performance needs and used different training strategies.
- Big model achieved **1e-6FAR@recall 90%** for different races, including Caucasian, African, Asian, Indian, and Latino.

Chinese Academy of Science, Shenzhen Institutes of Advanced Technology **Shenzhen, China**
Research Assistant *Jul. 2018 — Jun. 2019*

- Led a team of four to develop a multi-stage abnormal condition detection system for real-time baby monitoring, which could detect whether babies were sleeping, vomiting, or their faces were covered.

The Chinese University of Hong Kong, Shenzhen Research Institute **Shenzhen, China**
Research Intern *Dec. 2017 — Jun. 2018*

- Designed and implement a visual tracking system for pedestrian detection and tracking.
- Split the target bounding box into 64 patches which were desecrated by RGB and Gradient features.
- Determined foreground and background description using random walk with restart simulations.
- Incorporated spatially ordered and weighted patch descriptor into the structured output tracking framework.

Patents

1. **Wanrong Zheng**, Xiaoke Jiang, Jikui Bao, Qichen Li and Cong Ji. **A Railway Face Recognition Solution Based on History Passengers' Riding Pattern.***CN202110654499.8* (2021)
2. **Wanrong Zheng** and Xiaoke Jiang. **A Identification method Based on History Passenger Flow Big Data.***CN202011132611.3* (2020)
3. Sun Zhe and **Wanrong Zheng**. **Passenger Illegal Handing Bags Across Railing Detection in Real Railway Scene.** (2020)