

EDUCATION

University of Southern California, Ph.D. student in Computer Science, Advisor: Prof. Laurent Itti	May. 2024 — Present
University of Southern California, M.S. in Computer Science, Advisor: Prof. Ram Nevatia & Prof. Laurent Itti	Aug. 2020 — May. 2023
South University of Science and Technology, Exchange in Computer Science	Jan. 2021 — Jun. 2021
Anhui University, B.S. in Computer Science, GPA: 89.07/100, top 6%	Sep. 2014 — Jun. 2018

RESEARCH INTERESTS

- **Multi-modal Perception** [2, 3, 4, 5]: Exploring the synergistic effects of diverse data for enhanced machine understanding.
- **Explainable Artificial Intelligence** [1]: Transparent and effective human-in-the-loop learning.

PUBLICATIONS

1. **Wanrong Zheng***, Yunhao Ge*, Xingrui Wang, Di Wu, Yao Xiao, Xu Zhi, Linwei Li, Ziyang Wu, and Laurent Itti. **Teaching and Interacting with Neural Networks: A Framework for Intuitive Knowledge Exchange and Reasoning Correction**. *Under review*.
2. **Wanrong Zheng***, Haidong Zhu*, Zhaoheng Zheng, and Ram Nevatia. **GaitSTR: Gait Recognition with Sequential Two-stream Refinement**. *IEEE Transactions on Biometrics, Behavior, and Identity Science (TBIOM'24)*. [[paper](#)].
3. Haidong Zhu, **Wanrong Zheng**, Zhaoheng Zheng, and Ram Nevatia. **ShARC: Shape and Appearance Recognition for Person Identification In-the-wild**. *IEEE/CVF Winter Conference on Applications of Computer Vision (WACV'24)*. [[paper](#)][[slides](#)].
4. Haidong Zhu*, **Wanrong Zheng***, Zhaoheng Zheng, and Ram Nevatia. **GaitRef: Gait Recognition with Refined Sequential Skeletons**. *IEEE International Joint Conference on Biometrics (IJCB'23)*, (Oral). [[paper](#)][[code](#)][[project](#)].
5. Haidong Zhu, Zhaoheng Zheng, **Wanrong Zheng**, and Ram Nevatia. **CAT-NeRF: Constancy-Aware Tx²Former for Dynamic Body Modeling**. *IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPRW'23)*. [[paper](#)][[code](#)][[supp](#)].
6. 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](#)][[supp](#)][[slides](#)].

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

iLab, University of Southern California Los Angeles, CA
Research Assistant, Advisor: Prof. [Laurent Itti](#) Jan. 2022 — Present

- **Teaching and Interacting with Neural Networks: A Framework for Intuitive Knowledge Exchange and Reasoning Correction**
 - Proposed a pipeline for humans to directly interact with Neural Networks on a structural representation of visual concepts.
 - Constructed Structural Concept Graphs (SCG), a reasoning logic mechanism of Neural Networks in classification tasks, using 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 primary-author paper [1].

IRIS Computer Vision Lab, University of Southern California Los Angeles, CA
Research Assistant, Advisor: Prof. [Ram Nevatia](#) Jan. 2022 — May. 2024

- **GaitRef: Gait Recognition with Refined Sequential Skeletons Knowledge Exchange**
 - Combined the silhouettes and skeletons information and refined the framewise joint predictions for gait recognition.
 - On Gait3D, the proposed method outperformed the baseline by 6.1% on Rank-1 and 5.4% on Rank-5.
 - Published one primary-author paper on IJCB 2023 [4]. This work contributed to a four-year project sponsored by IARPA.
- **CAT-NeRF: Constancy-Aware Tx²Former 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.
 - Published one paper on CVPRW 2023 [5].

Identity Verification, SenseTime

Research Engineer, Advisor: Dr. [Yichao Wu](#) & Mr. [Ding Liang](#)

Shenzhen, China

Jan. 2021 — Aug. 2021

• Phone Unlock Facial Verification

- Built a multi-race and multi-factor (hat, glasses, etc.) testset as the evaluation testset to promote granularity of evaluation result.
- Implemented different image preprocessing approaches and found the best crop and alignment way for phone recognition.
- Applied feature ensemble, Adaptation training, and hard data mining to enhance performance on a weak domain while keeping accuracy on others.
- Achieved $1e-6\text{FAR}@recall 87.65\%$ (increased by 7.41%) on African race subset.

• Knowledge Distillation Optimization

- Proposed a 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 and student hidden layers as knowledge distillation loss.
- The $1e-5\text{FAR}@recall$ increased by 2.93% on Chinese Face Unlock.

Smart City Group, SenseTime

Research Engineer, Advisor: Dr. [Xiaoke Jiang](#) & Dr. [Junjie Yan](#)

Shenzhen, China

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 could 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 [6].

• 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 and visual scores.
- The presented spatial-temporal pattern could aid the verification, which avoided 15.9% of real-world hard cases.

WORK

SenseTime Research

Algorithm Development Engineer, Advisor: Dr. [Yichao Wu](#) & Dr. [Xiaoke Jiang](#)

Shenzhen, China

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 $1e-6\text{FAR}@recall 90\%$ for different races, including Caucasian, African, Asian, Indian, and Latino.

Chinese Academy of Science, Shenzhen Institutes of Advanced Technology

Research Assistant

Shenzhen, China

Jul. 2018 — Jun. 2019

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

The Chinese University of Hong Kong, Shenzhen Research Institute

Research Intern

Shenzhen, China

Dec. 2017 — Jun. 2018

- Designed and implement a visual tracking system for pedestrian detection and tracking.
- Split the target bounding box into 64 patches 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)