Tao, Yiran (Elaine)

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Education

Wuhan University (WHU), Wuhan, China — Sept. 2019 - Jun. 2023 (Expected)
- Bachelor of Engineering in Computer Science and Technology — **GPA: 3.93/4.0**
- Bachelor of Arts in English — **GPA: 3.90/4.0**

Harvard College, Cambridge, MA, US — Jan. 2022- May. 2022
- **Visiting Undergraduate Student Program(Concentration on Computer Science)** — **GPA: 4.0/4.0**
  Coursework: STAT 195: Introduction to Supervised Learning
  COMPSCI 91R: Supervised Reading and Research
- **Co-enrolled in Massachusetts Institute of Technology (MIT)** — **GPA: 5.0/5.0**
  Coursework: 6.819: Advances in Computer Vision (scored full marks)

Harvard Summer School, Cambridge, MA, US — Jul. 2022- Jul. 2022
Coursework: MATH S-302 Math for Teaching Geometry — **GPA: 4.0/4.0**

Awards:

Luojia Excellent Overseas Communication Scholarship of Wuhan University	2022
First-class Excellent Student Scholarship of Wuhan University (top 5%)	2021
Yugang-Songxiao Special Scholarship of Wuhan University (top 1%)	2021
Runner-up, Crowd Counting Track, ICCV 2021 VisDrone Challenge	2021

Publications

- **Yiran Tao**, Yaosi Hu, Zhenzhong Chen. "Learn to Look Around: Deep Reinforcement Learning Agent for Video Saliency Prediction". IEEE International Conference on Visual Communications and Image Processing (VCIP), 2021.
- Weijian Ruan*, **Yiran Tao***, Linjun Ruan, Xiujun Shu, Yu Qiao. "Temporal Weighting Appearance-Aligned Network for Nighttime Video Retrieval". IEEE Signal Processing Letters, 2022.
- **Yiran Tao**, Yaosi Hu,Zhenzhong Chen. "Memory-Guided Normality Patterns Representation Matching for Unsupervised Video Anomaly Detection".(to soon be submitted to IEEE Transactions on Multimedia).

Research Experience

RA, Visual Computing Group, Harvard University — Cambridge, MA, US
Advisor: Prof. **Hanspeter Pfister** (Harvard University)
Semi-supervised Edge-Guided Cell Instance Segmentation for Embryo Images — Mar. 2022-Present
- Implemented baseline models to analyze five key morphokinetic features of human embryos, namely segmentation of zona pellucida, grading of degree of fragmentation, classification of developmental stage, instance segmentation of cells, and object instance segmentation of pronuclei.
- Utilized edge detection to improve performance of cell instance segmentation; designed a novel semi-supervised edge detection model to perform with only a portion of labels available. The model captures typical patterns of embryo edge maps using labeled data, and forces edge maps generated with unlabeled data to match the captured typical patterns.
- Currently completing experimental work towards a publication.

RA, Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences Shenzhen, China
Advisor: Dr. **Weijian Ruan** (Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences)
Nighttime Video-based Person Re-identification — Aug. 2021-Dec. 2021
- Built a dataset for a novel task, namely video-based person re-identification during *nighttime*. Conducted thorough data filtration to ensure data distribution of the final dataset accurately represent the characteristics of the complex nighttime scenarios and differ representatively from existing daytime datasets.

- Designed a temporal weighting appearance-aligned model according to the characteristics of the task. The model aligns the appearance features among adjacent video frames and evaluates the qualities of frames to assign different weights to different frames to generate better representations for videos.
- Composed a co-first author academic paper published in IEEE Signal Processing Letters.

RA, Intelligent Information Processing Lab, Wuhan University Wuhan, China
Advisor: Prof. **Zhenzhong Chen** (Wuhan University)

Project 1: Visual Relationship Reasoning for Unsupervised Video Anomaly Detection with Scene Information Sept. 2022-Present

- Novelly introduced scene information into the task of Unsupervised Video Anomaly Detection (UVAD). Built a new UVAD dataset that defines an event to be normal or not according to the scene it takes place.
- Proposed to utilize visual relationships to deduce scene information for UVAD. Currently designing a reinforcement learning agent that utilizes Asynchronous Advantage Actor-Critic algorithm to re-rank candidate visual relations detected by baseline visual relationship detection models to select visual relations of the greatest importance, and a reasoning algorithm to utilize such relations for UVAD.

Project 2: Memory-Guided Normality Patterns Representation Matching for Unsupervised Video Anomaly Detection Dec. 2021-Apr. 2022

- Proposed a novel model for Unsupervised Video Anomaly Detection to to capture the prototypical patterns of normal events and identify anomalies based on whether an event's representation matches the captured normality patterns.
- Proposed two novel protocols, namely pseudo-label generation protocol and anomalous event generation protocol to adapt to the strict unsupervised setting. The full model outperforms state-of-the-art methods.
- Composed a first-author academic paper to soon be submitted to IEEE TMM.

Project 3: Crowd Counting for UAV RGB-T Images (ICCV 2021 Challenge) May 2021-Jul. 2021

- Conducted thorough analysis of the data distribution of a newly proposed UAV RGB-T dataset.
- Designed a novel model to effectively extract multiscale features from different modalities and generate adaptive density maps based on local crowd densities for crowd counting on UAV RGB-T images.
- Participated in the Crowd Counting Track of VisDrone 2021 Challenges, organized in conjunction with ICCV 2021. Ranked 1st and 2nd respectively on the two metrics, and received the Runner-Up team award.

Project 4: Video Saliency Prediction with Deep Reinforcement Learning Aug. 2020-Jun. 2021

- Proposed a reinforcement learning agent that uses deep Q-network to generate windows of frames with the most highly correlated information for saliency prediction, to assist in temporal information extraction.
- Applied the proposed method to various state-of-the-art backbone models without deconstructing the backbone structures and improved their performance to achieve state-of-the-art accuracy.
- Composed a first-author academic paper published in IEEE flagship conference IEEE VCIP 2021.

RA, Jiangsu WebAce Intelligent Industry Innovation Center, Nanjing University Nanjing, China
Advisor: Prof. **Yang Gao** (Nanjing University) Jul. 2019 - Nov. 2019

NAO Robot Programming for the Purpose of Human-Robot Interaction and Company Introduction

- Used Neo4j to establish mind maps to relate the information received by NAO to corresponding reactions.
- Optimized the NAO robot's software system to incorporate the function of introducing the company.

Teaching Experience

Tutor of High School Mathematics, Wuhan, China Aug. 2019- May 2021

- Tutored a high school student twice a week for two academic years. Helped the student develop a genuine interest in mathematics.
- Organized knowledge points for the student. Carefully selected problem sets in accordance to the student's academic level and guided the student through the solution process.

Skills

Programming	Python, Java, C/C++, R language, Matlab, Pytorch, Tensorflow, Keras, Linux
English	TOEFL: Total 108 (Reading 29, Listening 28, Speaking 25, Writing 26) GRE: Verbal 157, Quantitative 170, AW 4.0
Other Languages	Chinese (Native), Japanese (Intermediate), French (Intermediate), Spanish (Elementary)