

CHENGZHI CAO

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Hefei, China

EDUCATION

South China University of Technology Bachelor of Technology in Electrical Engineering and Automation Overall GPA: 3.85/4.0	Project 985 & 211, Guangdong, China 2017.9 - 2021.6
University of Science and Technology of China School of Information Science and Technology	Project 985 & 211, Anhui, China 2021.9 - Present

HONORS

• National Scholarship (top1%, highest scholarship from Ministry of Education of China)	2018
• National Scholarship (top1%, highest scholarship from Ministry of Education of China)	2019
• National Scholarship (top1%, highest scholarship from Ministry of Education of China)	2020
• Top Undergraduate Student Award (highest honor of undergraduates, only 10 winners)	2021
• First Prize in RoboMaster University League	2020
• First Prize in The Chinese Mathematics Competitions	2021

RESEARCH INTERESTS

Video Restoration (deblurring and super-resolution), bayes learning and bio-inspired Intelligence

PUBLICATIONS

- [1] **Event-guided Person Re-Identification via Sparse-Dense Complementary Learning**
Chenzhi Cao, Xueyang Fu*, Hongjian Liu, Yukun Huang, Kunyu Wang, Jiebo Luo, Zheng-jun Zha
IEEE Conference on Computer Vision and Pattern Recognition (**CVPR Accept**). Mar. 2023 [\[Paper\]](#) [\[Code\]](#)
- [2] **Event-driven Video Deblurring via Spatio-Temporal Relation-Aware Network**
Chenzhi Cao, Xueyang Fu*, Yurui Zhu, Gege Shi, Zheng-jun Zha
IJCAI (**Long Oral Accept, Acceptance Rate<3.75%**). Apr. 2022 [\[Paper\]](#) [\[Code\]](#)
- [3] **Generalized UAV Object Detection via Frequency Domain Disentanglement**
Kunyu Wang, Xueyang Fu*, Hongjian Liu, Yukun Huang, **Chengzhi Cao**, Gege Shi, Zheng-jun Zha
IEEE Conference on Computer Vision and Pattern Recognition (**CVPR Accept**). Mar. 2023
- [4] **Single Image Shadow Detection via Complementary Mechanism**
Yurui Zhu, Xueyang Fu*, **Chengzhi Cao**, Xi Wang, Qibin Sun, Zheng-jun Zha
Proceedings of the ACM International Conference on Multimedia (**ACM MM Accept**). Jun. 2022 [\[Paper\]](#)[\[Code\]](#)
- [5] **Discovering Intrinsic Spatial-Temporal Logic Rules to Explain Human Actions**
Chengzhi Cao, Chao Yang, Shuang Li*
Conference on Neural Information Processing Systems (NeurIPS Under Review), May. 2023.
- [6] **Event-guided Video Restoration with Spiking-Convolutional Architecture**
Chenzhi Cao, Xueyang Fu*, Yurui Zhu, Zhijiang Sun, Zheng-jun Zha
IEEE Transactions on Neural Networks and Learning Systems (TNNLS Under Review), Sep. 2022
- [7] **Generalized Cryo-Electron Tomography Image Denoising via Frequency Domain Mining**
Chengzhi Cao, Tianyang Wang, Zhaoxin Fan, Min Xu*
International Conference on Computer Vision (ICCV Under Review), May. 2023.

RESEARCH EXPERIENCE

Bio-inspired Video Processing with Guidance of Events University of Science and Technology of China
Sep. 2021 - Mar. 2022

Advisors: [Prof. Xueyang Fu](#) and [Zhengjun Zha](#)

Video Deblurring

- Propose a spatio-temporal relation-aware network for event-driven video deblurring, and achieve better performance through fusing features of frames and events properly.
- Propose a spiking neural temporal memory module by capturing long-term relations of event sequences.
- Extract the spatial correlation between frames and events to exploit the complementary information from them.

- Extensive experiments show that our method achieves the SOTA performance on banchmark of video deblurring dataset, including GoPro and HQF.

Video Person Identification

- The first eventguided solution to tackle the video-based Re-ID task.
- Propose a sparse-dense complementary learning network to fully utilize the sparse events and dense frames simultaneously to enhance identity representation learning in degraded conditions.
- Design a deformable spiking neural network to suit the sparse characteristics of event streams, which greatly utilizes the spatial consistency of events to provide motion information for dense RGB frames.

Generalized Cryo-Electron Tomography Image Denoising

Carnegie Mellon University

Oct. 2022 - Mar. 2023

Advisors: **Prof.**[Min Xu](#)

- Design a novel framework for unsupervised Cryo-Electron Tomography Image denoising, leveraging domain adaptation and Fourier transform.
- Develop a Fourier style mining generator to produce high-quality real-like images by converting images into frequency domain and then identifying domain-variant frequency components.
- Propose a cross distillation and refinement mechanism to learn domain-invariant representations by distribution alignment, narrowing the distribution gap between synthetic and real data domains.

Spatial-Temporal Logic Learning to Explain Human Actions

Chinese University of Hong Kong

May. 2022 - Present

Advisors: **Prof.**[Shuang Li](#)

- Propose a tractable and differentiable algorithm that can jointly learn the rule content and model parameters from observational data.
- The overall procedure is an expectation-maximization algorithm, where we treat the rule set as latent variables.
- In the E-step, the posterior distribution over the latent rule set is evaluated. In the M-step, the model parameters are optimized by maximizing the expected log-likelihood with respect to the current posterior.
- We demonstrated the promising performance of 64 our model in terms of human action prediction and explanation on two interesting real datasets.

Low-quality Video Detection and Filtering

Tencent, Shenzhen

March. 2021 - July. 2021

Advisors: **Prof.**[Kwok Wai Hung](#) and [Simon Lui](#)

- Design a multi-scale structure to take advantage of inter-scale correlation for video super-resolution in QQ Music, optimize it by removing unnecessary modules to simplify the network architecture.
- Smoke Detection. Identify the key points of multiple faces, and use them to locate the user's mouth; calculate the matching parameters between the cigarette and mouth. This project is now under implementation.
- **Patent Application Number:** 2021111598150, 2021109153727, 2021107976749

COMPETITIONS

Third Prize: [CVPR Workshop MIPI-challenge](#) - RGBW Joint Fusion and Denoise

Third Prize: [CVPR Workshop NTIRE 2023](#) - HR Depth from Images of Specular and Transparent Surfaces

SERVICES

Program Committee/External Reviewer: ICCV 2023, ACM MM 2023

SKILLS

Interests: behavior modeling, logic learning and low-level vision (deblurring, super-resolution and deraining)

Programming: Python (Pytorch, Opencv), LATEX, Matlab, Microsoft Office

Mathematics: Linear Algebra, Vector Calculus, Probability and Statistic

English: GRE (V158+Q170+AW3.5)