Ruian He

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Education

- **Fudan University**, Ph.D. in Computer Science — Sept 2021 –

Supervisor: Prof. Bo Yan

Research Interest: Low-level computer vision, such as super-resolution, denoising and frame interpolation.

- **Fudan University**, B.S. in Computer Science — Sept 2016 – June 2021

GPA: 3.59/4.0

Coursework: Computer Architecture, Comparison of Learning Algorithms, Computer Network

Publications

- **Efficient Online Training for Zero-Shot Time-Lapse Microscopy Denoising and Super-Resolution** — AAAI 2025

Ruian He, Ri Cheng, Xinkai Lyu, Weimin Tan, Bo Yan

We introduce MDSR-Zero, a zero-shot online learning method designed for plug-and-play noise suppression and super-resolution of microscopy videos. Our method can reduce training time by up to 10x compared to the previous SOTA method.

- **Pre-training a Foundation Model for Generalizable Fluorescence Microscopy-Based Image Restoration** — Nature Methods 2024

Chenxi Ma, Weimin Tan, **Ruian He**, Bo Yan

We provide a universal fluorescence microscopy-based image restoration (UniFMIR) model to address different restoration problems, and show that UniFMIR offers higher image restoration precision, better generalization and increased versatility.

- **FacialFlowNet: Advancing Facial Optical Flow Estimation with a Diverse Dataset and a Decomposed Model** — ACMMM, 2024

Jianzhi Lu*, **Ruian He***, Shili Zhou, Weimin Tan, Bo Yan

We proposes FacialFlowNet, a novel large-scale facial optical flow dataset, and the Decomposed Facial Flow Model, the first method capable of decomposing facial flow.

- **Low-latency Space-time Supersampling for Real-time Rendering** — AAAI 2024

Ruian He, Shili Zhou, Yuqi Sun, Ri Cheng, Weimin Tan, Bo Yan

We recognize the shared context and mechanisms between frame supersampling and extrapolation, save up to 75% of time against the conventional two-stage pipeline that necessitates 17ms.

- **SAMFlow: Eliminating Any Fragmentation in Optical Flow with Segment Anything Model** — AAAI, 2024

Shili Zhou, **Ruian He**, Weimin Tan, Bo Yan

Through theoretical analysis, we find the pre-trained large vision models are helpful in optical flow estimation, and SAM is suitable for solving the fragmentation problem.

- **Context-Aware Iteration Policy Network for Efficient Optical Flow Estimation** — AAAI, 2024

Ri Cheng, **Ruian He**, Xuhao Jiang, Shili Zhou, Weimin Tan, Bo Yan

We develop a Context-Aware Iteration Policy Network, which determines the optimal number of iterations per sample and reduces FLOPs by about 40

- **Uncertainty-Guided Spatial Pruning Architecture for Efficient Frame Interpolation** — ACMMM, 2023

Ri Cheng, Xuhao Jiang, **Ruian He**, Shili Zhou, Weimin Tan, Bo Yan

We develop an Uncertainty-Guided Spatial Pruning (UGSP) architecture to skip redundant computation for efficient frame interpolation dynamically.

- **MVFlow: Deep Optical Flow Estimation of Compressed Videos with Motion Vector Prior** ACMMM, 2023

Shili Zhou*, Xuhao Jiang*, Weimin Tan, **Ruian He**, Bo Yan

We propose an optical flow model, MVFlow, which uses motion vectors to improve the speed and accuracy of optical flow estimation for compressed videos.

- **Motion Matters: Difference-based Multi-scale Learning for Infrared UAV Detection** CVPR Workshops, 2023

Ruian He, Shili Zhou, Ri Cheng, Yuqi Sun, Weimin Tan, Bo Yan

Our method utilizes the frame difference of multiple previous frames and fuses multiple spatial-temporal scales.

- **Fine-grained Blind Face Inpainting with 3D Face Component Disentanglement** ICASSP, 2023

Yu Bai, **Ruian He**, Weimin Tan, Bo Yan, Yangle Lin

We propose a novel fine-grained blind face inpainting framework and build up a new dataset called CelebO-3D.

- **Co-completion for Occluded Facial Expression Recognition** ACMMM, 2022

Zhen Xing*, Weimin Tan*, **Ruian He**, Yangle Lin, Bo Yan

We propose a task-specific framework which first combines occlusion discarding and feature completion together to reduce the interference of occlusions on instance level.

Services

- **Conference Reviewer**

CVPR (2022, 2024), NIPS (2024), ICCV (2023), ECCV (2024), AAAI (2023, 2024, 2025), IEEEVR (2023), ACMMM (2024).

- **Journal Reviewer**

TOG(2024), TPAMI (2024), TCSVT (2024).

- **Teaching Assistant**

COMP130018.01 Computer Graphics A (2023 Spring, 2024 Spring), **COMP130014.01** Compiler (2022 Autumn).

Awards

National Scholarship (Top 1%)	2024
Jinrirencai Scholarship (10 students in Fudan)	2024
Award for Outstanding Ph.D. Students.	2021-2023
Boxue Scholarship (Top 10%)	2017
Award for Outstanding Undergraduate Students.	2018-2020