

JUN XIAO

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Education Background

The Hong Kong Polytechnic University

Aug. 2018 - Oct. 2022

Ph.D. in Electronic and Information Engineering (full scholarship), supervised by Prof. Kin-Man Lam

Hong Kong

- Research interests: image/video restoration and enhancement, high-dimensional signal processing, lightweight models for image/video processing, and Bayesian machine learning.

The Hong Kong Polytechnic University

Sep. 2016 - Mar. 2018

MSc in Electronic and Information Engineering (Distinction)

Hong Kong

- Award: the outstanding student scholarship (Top 5%)

Guangdong University of Technology

Sep. 2012 - Jun. 2016

Bachelor in Telecommunication and Engineering

Guangzhou, China

- Award: the outstanding student scholarship (Top 5%)

Working Experience

The Hong Kong Polytechnic University

Nov. 2022- Present

Postdoctoral Researcher

Hong Kong

- Focus on image/video restoration (e.g., super-resolution, denoising, etc.), image/video quality enhancement and processing (e.g., realistic image generation, etc.), high dynamic range imaging, and probabilistic machine learning.

Microsoft Research Asia (MSRA)

Sep. 2021-Jan. 2022

Machine Learning Researcher, Intern (Award: Stars of Tomorrow Internship)

Shanghai, China

- The core member in the project “online video restoration and enhancement system” is responsible for investigating deep spatial-temporal models (i.e., RNN, LSTM, Transformer, etc.) for real-time video processing.
- Proposed a novel knowledge transfer method based on the optimal transport theory, which transfers kernel priors from pre-trained restoration models to lightweight models. **The performance of the lightweight models can be improved by 0.15 dB without increasing model complexity.**
- **The proposed method can significantly accelerate the running speed by 400%.** The research outputs have been used in Microsoft products like Teams and Xbox. **(Published in the IEEE-TMM, 2023)**

Research Projects

High Dynamic Range (HDR) Imaging With Large-scale Motion

Apr. 2021-Apr. 2022

- The ghosting artifacts and corrupted content caused by objective motions are challenging issues for HDR imaging.
- Proposed a progressive feature fusion scheme for deep learning models which can effectively generate ghost-free HDR images. **The proposed method can achieve 44.06 dB in terms of PSNR, which significantly outperforms the baseline method by 1.35 dB. (Published in ACM(MM), 2021)**
- Proposed a sampling and aggregation network for HDR imaging in the wavelet domain. The method hierarchically selects similar image patches from multi-scale spaces and then aggregates them for motion alignment. In addition, wavelet transform is adopted for feature fusion, which can effectively restore the corrupted contents. **The performance can be up to 44.38 dB, which is 1.68 dB higher than the baseline. (Submitted to TMM, 2022)**

Deep Lightweight Image Super-resolution (SR) Models

Sep. 2020-Apr. 2021

- Existing deep image SR models require high computational complexity and memory consumption, making them less applicable in resource-constraint devices, e.g., mobile phones, personal computers, etc.
- Proposed a feature compression algorithm based on the knowledge-distillation module. Compared with the benchmark, e.g., EDSR (1,370K, 26.07dB), the proposed method can **reduce the model parameters by 50%** and achieve comparable performance (**ours: 690K, 25.89dB**). **(Published in ICASSP, 2021)**
- Designed a lightweight, spatially variant convolutional kernel, which **significantly reduces the model complexity by 78%**. Compared with other lightweight models, **the proposed model can achieve the best performance, with only 264K model parameters. (Published in ACM(MM), 2021)**

The Distortion-perception Trade-off for Image Super-resolution

Apr. 2020-Apr. 2021

- Proposed an efficient image fusion algorithm based on optimal transport theory in the wavelet domain, which can effectively maintain the distortion quality and **improve the perceptual quality by 50%** in the Set14 dataset. In addition, **the average running time is reduced from 5.6 hours to 3.6 seconds, without GPU requirements. (Published in Neurocomputing, 2021)**

Selected Publications

1. **Jun, Xiao**, Qian, Ye, Tianshan Liu, Cong Zhang and Kin-Man Lam. “Multi-scale Sampling and Aggregation Network For High Dynamic Range Imaging.” IEEE Transaction on Multimedia, 2023. (**JCR-Q1**, under Review)
2. **Jun Xiao**, Qian Ye, Rui Zhao, Kin-man Lam, et al, “Deep Multi-scale Feature Mixture Model for Real-world Single Image Super-resolution”, Signal Processing: Image Communication, 2023. (**JCR-Q1**, under Review)
3. **Jun Xiao**, Kin-Man Lam, et al. “Online Video Super-Resolution with Convolutional Kernel Bypass Graft.” IEEE Transaction on Multimedia, 2023. (**JCR-Q1**)
4. **Jun, Xiao**, Qian, Ye and Rui, Zhao and Kin-Man, Lam and Kao Wan. “Self-feature Learning: An Efficient Deep Lightweight Model for Image Super-resolution“, ACM Conference on Multimedia, 2021. (**CCF-A**)
5. Qian Ye, **Jun Xiao**, et al. “Progressive and selective fusion network for high dynamic range imaging”, ACM conference on Multimedia, 2021. (**CCF-A**)
6. Zhao Rui, Liu Tianshan, **Xiao Jun**, et al. “Invertible Image Decolorization”. IEEE Transactions on Image Processing, 2021. (**JCR-Q1**, **CCF-A**)
7. **Jun Xiao**, Tianshan Liu, Rui Zhao, Kin-Man Lam, “Balanced Distortion and Perception in Single-Image Super-Resolution Based on Optimal Transport in Wavelet Domain”, Neuracomputing, 2021. (**JCR-Q1**)
8. **Jun Xiao**, Rui zhao, Kin-Man Lam, et al, “Bayesian Sparse Hierarchical Model for Image Denoising”, Signal Processing: Image Communication, 2021. (**JCR-Q1**)
9. **Jun Xiao**, Wenqi Jia, Kin-Man Lam, ”Feature redundancy mining: Deep light-weight image super-resolution model”, International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2021. (**CCF-B**)
10. Tianshan Liu, Rui Zhao, **Jun Xiao**, Kin-Man Lam, ”Progressive Motion Representation Distillation With Two-Branch Networks for Egocentric Activity Recognition”, IEEE Signal Processing Letters, 2020. (**JCR-Q1**)
11. **Jun Xiao**, Rui Zhao, Shun-Cheung Lai, Wenqi Jia, Kin-Man Lam, ”Deep Progressive Convolutional Neural Network for Blind Super-Resolution With Multiple Degradations”, in IEEE International Conference on Image Processing (ICIP), 2019. (**CCF-C**)

Related Skills

- **Program Skills:** Python (proficient), Pytorch (proficient), Microsoft Azure (proficient), Spark (distributed computing), Scikit-Learn (proficient), Matlab, SQL.
- **Languages:** English, Cantonese (native speaker), Mandarin (native speaker)

Academic Activities

Reviewers

- IEEE International Conference on Computer Vision and Pattern Recognition (CVPR), 2022.
- European Conference on Computer Vision (ECCV), 2022.
- ACM Conference on Multimedia (ACM MM), 2022.
- Asia Conference on Computer Vision (ACCV), 2022.
- IEEE International Conference on Visual Communications and Image Processing (VCIP), 2022.
- IEEE International Conference on Visual Communications and Image Processing (VCIP), 2020.