

# Wenhan YANG

*Ph. D. Candidate, Peking University*

## **CONTACT**

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## **RESEARCH INTEREST**

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- Image and video super-resolution
- Real-time video processing
- Bad weather restoration
- Joint task of low-level processing and high-level computer vision

## **EDUCATION**

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2012.9 – 2018.09	<b>Ph.D. student in Computer Science.</b> Institute of Computer Science & Technology, Peking University, China.
2008.9 – 2012.7	<b>B.S. major in Computer Science.</b> School of Electronics Engineering and Computer Science, Peking University, China.
2009.9 – 2012.7	<b>B.S. minor in Economy.</b> National School of Development, Peking University, China.

## **RESEARCH EXPERIENCE**

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2012.09 – 2018.09	<b>Ph.D. candidate in Video Information Processing (VIP) Group.</b> Institute of Computer Science & Technology, Peking University, China. Ph.D. supervisor: Prof. Zongming Guo. Ph.D. co-supervisor: Prof. Jiaying Liu. <ul style="list-style-type: none"><li>• Worked on <b>solving the inverse problem of the image restoration and bad weather restoration.</b><ol style="list-style-type: none"><li>1) Proposed a new interpolation method working in an adaptive constructed local window.</li></ol></li></ul>
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- 2) Proposed an image super-resolution approach in the framework of sparse coding with external compensation priors.
- 3) Developed a video super-resolution demo system, which can up-sample videos into HD ones in real time.
- 4) Proposed a video rain removal method based on recurrent neural networks to remove both rain streaks and occlusions.

2015.9 – 2016.9

**Visiting student in Learning and Vision (LV) Group**, Department of Electrical & Computer Engineering, National University of Singapore, Singapore.

Collaborator: Prof. Jiashi Feng and Prof. Shuicheng Yan.

- Worked on **deep learning-based image and video super-resolution, rain removal**.
  - 1) Proposed a new deep image SR method that connects the traditional band recovery paradigm as well as edge priors with deep networks.
  - 2) Proposed a new deep video SR method that can better percept inter-frame correlation.
  - 3) Proposed a deep joint rain detection and removal approach, which achieves very good visual quality especially in heavy rain cases.

## PUBLICATIONS

(\* Corresponding Author)

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### Journal

- [1] **Wenhan Yang**, Jiashi Feng, Jianchao Yang, Fang Zhao, Jiaying Liu, Zongming Guo, and Shuicheng Yan. "Deep Edge Guided Recurrent Residual Learning for Image Super-Resolution", *IEEE Trans. on Image Processing (TIP)*, Vol. 26, No. 12, pp. 5895-5907, Dec. 2017.
- [2] **Wenhan Yang**, Sifeng Xia, Jiaying Liu, and Zongming Guo. "Reference Guided Deep Super-Resolution via Manifold Localized External Compensation", *Accepted by IEEE Trans. on Circuit System for Video Technology (TCSVT)*, May 2018.
- [3] **Wenhan Yang**, Jiaying Liu, Mading Li, and Zongming Guo. "Isophote-Constrained Autoregressive Model with Adaptive Window Extension for Image Interpolation", *IEEE Trans. on Circuit System for Video Technology (TCSVT)*, Vol.28, No.5, pp.1071-1086, May 2018..
- [4] **Wenhan Yang**, Jiashi Feng, Guosen Xie, Jiaying Liu, Zongming Guo, and Shuicheng Yan. "Video Super-Resolution Based on Spatial-Temporal Recurrent Residual Networks", *Computer Vision and Image Understanding (CVIU)*, Vol.168, pp.79-92, March. 2018.
- [5] **Wenhan Yang**, Jiaying Liu, Sifeng Xia, Zongming Guo. "Data-Driven External Compensation Guided Deep Networks for Image Super-Resolution", *Ruan Jian Xue Bao/Journal of Software*, Vol.29, No.4, pp.900-913, April 2018.
- [6] Jiaying Liu, **Wenhan Yang\***, Shuai Yang, and Zongming Guo. "D3R-Net: Dynamic Routing Residue Recurrent Network for Video Rain Removal", *IEEE Trans. on Image Processing (TIP)*, Vol.28, No.2, pp.699-712, Feb. 2019.
- [7] Jiaying Liu, Sifeng Xia, **Wenhan Yang\***, Mading Li, and Dong Liu. "One-for-All: Grouped Variation Network Based Fractional Interpolation in Video Coding", *Accepted by IEEE Trans. on Image Processing (TIP)*, Nov. 2018.
- [8] Jiaying Liu, **Wenhan Yang**, Xiaoyan Sun, and Wenjun Zeng. "Photo Stylistic Brush: Robust Style Transfer via Superpixel-Based Bipartite Graph", *IEEE Trans. on Multimedia (TMM)*, Vol.20, No.7, pp.1724-1737, July 2018.
- [9] Jiaying Liu, **Wenhan Yang**, Xinfeng Zhang, and Zongming Guo. "Retrieval Compensated Group Structured Sparsity for Image Super-Resolution", *IEEE Trans. on Multimedia (TMM)*, Vol.19, No.2, pp.302-316, Feb. 2017.

- [10] Yongqin Zhang, Jiaying Liu, **Wenhan Yang**, and Zongming Guo. "Image Super-Resolution Based on Structure-Modulated Sparse Representation", *IEEE Transactions on Image Processing (TIP)*, Vol.24, No.9, pp.2797-2810, May 2015.
- [11] Mading Li, Jiaying Liu, **Wenhan Yang**, Xiaoyan Sun, and Zongming Guo. "Structure-Revealing Low-Light Image Enhancement via Robust Retinex Model", *IEEE Trans. on Image Processing (TIP)*, Vol.27, No.6, pp.2828-2941, June 2018.
- [12] Fang Zhao, Jiashi Feng, Jian Zhao, **Wenhan Yang**, and Shuicheng Yan. "Robust LSTM-Autoencoders for Face De-Occlusion in the Wild", *IEEE Trans. on Image Processing (TIP)*, Vol.27, No.2, pp.778-790, Feb. 2018.
- [13] Guo-Sen Xie, Xu-Yao Zhang, **Wenhan Yang**, Mingliang Xu, Shuicheng Yan, and Cheng-Lin Liu. "LG-CNN: From local parts to global discrimination for fine-grained recognition", *Pattern Recognition (PR)*, Vol.71, pp.118–131, Nov. 2017.
- [14] **Wenhan Yang**, Robby T. Tan, Jiashi Feng, Jiaying Liu, Zongming Guo, Shuicheng Yan, Joint Rain Detection and Removal from a Single Image with Contextualized Deep Networks, *IEEE Trans. on Pattern Analysis and Machine Intelligence (TPAMI)*, Under Review.
- [15] **Wenhan Yang**, Jiaying Liu, Shuai Yang, Zongming Guo. "Scale-Free Single Image Deraining Via Visibility-Enhanced Recurrent Wavelet Learning", *Transactions on Image Processing (TIP)*, Under Review.

## Conference

- [1] **Wenhan Yang**, Robby T. Tan, Jiashi Feng, Jiaying Liu, Zongming Guo, and Shuicheng Yan. "Joint Rain Detection and Removal from a Single Image", *Proc. of IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Honolulu, Hawaii, Jul. 2017.
- [2] **Wenhan Yang**, Shihong Deng, Yueyu Hu, Junliang Xing, and Jiaying Liu. "Real-Time Deep Video SpaTial Resolution UpConversion SysTem (STRUCT++ Demo)", *Proc. of ACM International Conference on Multimedia (ACM MM)*, Demo, Silicon Valley, California, U.S., Oct. 2017.
- [3] **Wenhan Yang**, Jiaying Liu, and Sifeng Xia. "Variation Learning Guided Convolutional Network for Image Interpolation", *Proc. of IEEE International Conference on Image Processing (ICIP)*, Beijing, China, Sep. 2017.
- [4] **Wenhan Yang**, Jiaying Liu, Saboya Yang, and Zongming Guo. "Image Super-Resolution via Nonlocal Similarity and Group Structured Sparse Representation", *Proc. of IEEE Visual Communications and Image Processing (VCIP)*, Singapore, Singapore, Dec. 2015.
- [5] **Wenhan Yang**, Jiaying Liu, Shuai Yang, and Zongming Guo. "Novel Autoregressive Model Based on Adaptive Window-Extension and Patch-Geodesic Distance for Image Interpolation", *Proc. of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Brisbane, Australia, Apr. 2015.
- [6] **Wenhan Yang**, Jiaying Liu, Mading Li, and Zongming Guo. "General Scale Interpolation Based on Fine-Grained Isophote Model with Consistency Constraint", *Proc. of IEEE International Conference on Image Processing (ICIP)*, Paris, France, Oct. 2014.
- [7] **Wenhan Yang**, Jiaying Liu and, Zongming Guo. "Spatial-Temporal Recurrent Residual Networks for Video Super-Resolution", *Proc. of International Forum of Digital TV and Wireless Multimedia Communication (IFTC)*, Shanghai, China, Nov. 2017.
- [8] Jiaying Liu, **Wenhan Yang\***, Shuai Yang, and Zongming Guo. "Erase or Fill? Deep Joint Recurrent Rain Removal and Reconstruction in Videos", *Proc. of IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Salt Lake City, Utah, U.S., June 2018.
- [9] Qian Rui, Robby Tan, **Wenhan Yang**, Jiajun Su, and Jiaying Liu. "Attentive Generative Adversarial Network for Raindrop Removal from a Single Image", *Proc. of IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Salt Lake City, Utah, U.S., June 2018.
- [10] Shuai Yang, Jiaying Liu, **Wenhan Yang**, and Zongming Guo. "Context-Aware Unsupervised Text Stylization", *Proc. of ACM Multimedia (ACM MM)*, Seoul, Korea, Oct. 2018.

- [11] Sifeng Xia, **Wenhan Yang**, Yueyu Hu, Siwei Ma, and Jiaying Liu. "A Group Variational Transformation Neural Network for Fractional Interpolation of Video Coding", *Proc. of Data Compression Conference (DCC)*, 2018.
- [12] Yueyu Hu, **Wenhan Yang**, Sifeng Xia, Wen-Huang Cheng, and Jiaying Liu. "Enhanced Intra Prediction with Recurrent Neural Network in Video Coding", *Proc. of Data Compression Conference (DCC)*, 2018.
- [13] Mading Li, Jiaying Liu, **Wenhan Yang**, and Zongming Guo. "Joint Denoising and Enhancement for Low-Light Images via Retinex Model", *Proc. of International Forum of Digital TV and Wireless Multimedia Communication (IFTC)*, Shanghai, China, Nov. 2017. **(Best paper award)**
- [14] Shihong Deng, Jiaying Liu, Mading Li, **Wenhan Yang**, and Zongming Guo. "General Scale Interpolation via Context-Aware Autoregressive Model and Multiplanar Constraint", *Proc. of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, New Orleans, U.S., March. 2017.
- [15] Yanghao Li, Jiaying Liu, **Wenhan Yang**, and Zongming Guo. "Neighborhood Regression for Edge-Preserving Image Super-Resolution", *Proc. of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Brisbane, Australia, Apr. 2015.

## **PATENTS**

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- [1] **Wenhan Yang**, Jiaying Liu, Mading Li, Zongming Guo. A method and device for image interpolation, Chinese Patent Application, 201410195204.5. (Patent Pending)
- [2] **Wenhan Yang**, Jiaying Liu, Mading Li, Zongming Guo. A method and device for image interpolation based on adaptive window extension autoregressive model, Chinese Patent Application, 201510628519.9. (Patent Pending)
- [3] **Wenhan Yang**, Jiaying Liu, Shuai Yang, Zongming Guo. An image reconstruction method and device based on online patch retrieval on Internet, Chinese Patent Application, 2015100633384.5. (Patent Pending)
- [4] Saboya Yang, Jiaying Liu, **Wenhan Yang**, Zongming Guo. A method and device for image processing, Chinese Patent Application, 201410426198.X. (Patent Pending)
- [5] Yanghao Li, Jiaying Liu, **Wenhan Yang**, Zongming Guo. A method and device for decomposition-based face hallucination, Chinese Patent Application, 201510621555.2. (Patent Pending)
- [6] Jiaying Liu, Sifeng Xia, **Wenhan Yang**, Zongming Guo. A method and device of image style brush based on superpixel bipartite graph matching, Chinese Patent Application, 201610390891.5. (Patent Pending)
- [7] Shihong Deng, Jiaying Liu, Mading Liu, **Wenhan Yang**. An image interpolation method and device based on context-aware autoregressive model, Chinese Patent Application, 201610819926.2. (Patent Pending)
- [8] Sifeng Xi, Jiaying Liu, **Wenhan Yang**, Zongming Guo. An image and video processing method and device, Chinese Patent Application, 201610232546.9. (Patent Pending)
- [9] Jiaying Liu, Zhihan Gao, **Wenhan Yang**, Mading Li, Zongming Guo. An image interpolation approach and system, Chinese Patent Application, 201610440640.3. (Patent Pending)
- [10] Jiaying Liu, **Wenhan Yang**, Wenjing Wang, Zongming Guo. An image interpolation approach and system, Chinese Patent Application, 201711236795.6. (Patent Pending)

## **HONORS AND PROFESSIONAL ACTIVITIES**

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Candidate of Outstanding Research Award, Peking University, 2018.

Winner of CVPR-2018 UG2 Challenge, 2018.

Outstanding Research Award, School of EECS, Peking University, 2017.

Excellent talents Award, Cooperative Medianet Innovation center, 2017.

Founder Scholarship, Founder Group, 2017.

Merit Student, School of EECS, Peking University, 2017.

Excellent Paper Award, ICST, Peking University, 2017.

Excellent Student Award, ICST, Peking University, 2017.

Reviewer for

- IEEE CVPR-2019 (IEEE Conference on Computer Vision and Pattern Recognition)
- IEEE Transactions on Image Processing
- IEEE Transactions on Circuits and Systems for Video Technology
- IEEE Transactions on Multimedia
- IEEE Access
- Elsevier Neurocomputing

## COMPUTER SKILLS

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Programming	Experience in DL platforms: Caffe, Lasagne, Pytorch, <i>etc.</i> 11 years of programming experience in C, C++ 10 years of programming experience (proficient) in MATLAB Other programming skills (familiar): SQL, Shell, Python, C#, LATEX
Platforms	Linux, Windows

## LANGUAGES

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Chinese	Native
English	Fluent in oral and good at writing

## REFERENCES

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### Dr. Zongming Guo

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Professor, Institute of Computer Science & Technology  
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