

# 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 - Present | <b>Ph.D. student in Computer Science.</b><br>Institute of Computer Science & Technology,<br>Peking University, China. Degree expected in July 2018. |
| 2008.9 – 2012.7  | <b>B.S. major in Computer Science.</b><br>School of Electronics Engineering and Computer Science,<br>Peking University, China.                      |
| 2009.9 – 2012.7  | <b>B.S. minor in Economy.</b><br>National School of Development, Peking University, China.  |

## RESEARCH EXPERIENCE

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| 2012.09 – Present | <b>Ph.D. candidate in Video Information Processing (VIP) Group.</b> Institute of Computer Science & Technology, Peking University, China.<br>Ph.D. supervisor: Prof. Zongming Guo.<br>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><li>2) Proposed an image super-resolution approach in the</li></ol></li></ul> |
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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**

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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**, Jiaying Liu, Mading Li, and Zongming Guo. "Isophote-Constrained Autoregressive Model with Adaptive Window Extension for Image Interpolation", *Accepted by IEEE Trans. on Circuit System for Video Technology (TCSVT)*, 2017.
- [3] **Wenhan Yang**, Jiashi Feng, Guosen Xie, Jiaying Liu, Zongming Guo, and Shuicheng Yan. "Video Super-Resolution Based on Spatial-Temporal Recurrent Residual Networks", *Accepted by Computer Vision and Image Understanding (CVIU)*, 2017.
- [4] Jiaying Liu, **Wenhan Yang**, Xiaoyan Sun, and Wenjun Zeng. "Photo Stylistic Brush: Robust Style Transfer via Superpixel-Based Bipartite Graph", *Accepted by IEEE Trans. on Multimedia (TMM)*, 2017.
- [5] 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.
- [6] Mading Li, Jiaying Liu, **Wenhan Yang**, Xiaoyan Sun, and Zongming Guo.

- "Structure-Revealing Low-Light Image Enhancement via Robust Retinex Model". *Accepted by IEEE Trans. on Image Processing (TIP)*, Feb. 2018.
- [7] 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.
  - [8] 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.
  - [9] Saboya Yang, Shuai Yang, **Wenhan Yang**, and Jiaying Liu. "Automatic Portrait Oil Painter: Joint Domain Stylization for Portrait Images", *Accepted by Multimedia Tools and Applications (MTAP)*, 2017.
  - [10] **Wenhan Yang**, Sifeng Xia, Jiaying Liu, Tiesong Zhao, and Zongming Guo. "Refined Manifold Localization with Deep External Prior for Reference Guided Super-Resolution", Submit to *IEEE Trans. on Circuit System for Video Technology (TCSVT)*, Under Review.
  - [11] **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, Submit to *IEEE Trans. on Pattern Analysis and Machine Intelligence (TPAMI)*, Under Review.

## Conference

- [1] **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.
- [2] **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.
- [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", *Accepted by IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2018.
- [9] Qian Rui, Robby Tan, **Wenhan Yang**, Jiajun Su, and Jiaying Liu. "Attentive Generative Adversarial Network for Raindrop Removal from a Single Image", *Accepted by IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, June 2018.
- [10] Sifeng Xia, **Wenhan Yang**, Yueyu Hu, Siwei Ma, and Jiaying Liu. "A Group Variational Transformation Neural Network for Fractional Interpolation of Video Coding", *Accepted by Data Compression Conference (DCC)*, 2018.
- [11] Yueyu Hu, **Wenhan Yang**, Sifeng Xia, Wen-Huang Cheng, and Jiaying Liu. "Enhanced Intra Prediction with Recurrent Neural Network in Video Coding", *Accepted by Data Compression Conference (DCC)*, 2018.
- [12] Sifeng Xia, **Wenhan Yang**, Jiaying Liu, and Zongming Guo. "Dual Recovery Network with Online Compensation for Image Super-Resolution". *Accepted by IEEE International Symposium on Circuits and Systems (ISCAS)*, May 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] Saboya Yang, Jiaying Liu, **Wenhan Yang**, and Shuai Yang. "Superpixel Bipartite Graph-Based Image Stylization", *Proc. of IEEE International Conference on Image Processing (ICIP)*, Beijing, China, Sep. 2017.
- [15] Yueyu Hu, Jiaying Liu, **Wenhan Yang**, Shihong Deng, Luyao Zhang, and Zongming Guo. "Real-Time Deep Image Super-Resolution via Global Context Aggregation and Local Queue Jumping", *Proc. of IEEE International Conference on Visual Communication and Image (VCIP)*, St. Petersburg, Florida, Dec. 2017.
- [16] Sifeng Xia, Jiaying Liu, **Wenhan Yang**, Mading Li, and Zongming Guo. "Deep Combined Image Denoising with Cloud Images", *Proc. of Pacific-Rim conference on Multimedia (PCM)*, Harbin, China, Sep. 2017.
- [17] Saboya Yang, Jiaying Liu, Shuai Yang, **Wenhan Yang**, and Zongming Guo. "Joint-Domain Unsupervised Stylization for Portraits", *Proc. of IEEE International Symposium on Circuits and Systems (ISCAS)*, Baltimore, MD, May 2017.
- [18] 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.
- [19] Sifeng Xia, Jiaying Liu, Yuming Fang, **Wenhan Yang**, and Zongming Guo. "Robust and Automatic Video Colorization via Multiframe Reordering Refinement", *Proc. of IEEE International Conference on Image Processing (ICIP)*,

Phoenix, U.S., Sep. 2016.

- [20] Shihong Deng, Jiaying Liu, Mading Li, **Wenhan Yang**, and Zongming Guo. "Autoregressive Image Interpolation via Context Modeling and Multiplanar Constraint", *Proc. of IEEE International Conference on Visual Communication and Image (VCIP)*, Chengdu, China, Nov. 2016.
- [21] Yanghao Li, Jiaying Liu, **Wenhan Yang**, and Zongming Guo. "Multi-Pose Face Hallucination via Neighbor Embedding for Facial Components", *Proc. of IEEE International Conference on Image Processing (ICIP)*, Quebec City, Canada, Sep. 2015.
- [22] Qingyun Wang, Jiaying Liu, **Wenhan Yang**, and Zongming Guo. "Adaptive Autoregressive Model with Window Extension via Explicit Geometry for Image Interpolation", *Proc. of IEEE International Conference on Image Processing (ICIP)*, Quebec City, Canada, Sep. 2015.
- [23] 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.
- [24] Mading Li, **Wenhan Yang**, Sijie Song, and Zongming Guo. "Error Concealment with Multiscale Patch Clustering and Low-Rank Minimization", *Proc. of Asia Pacific Signal and Information Processing Association (APSIPA)*, Hong Kong, China, Dec. 2015.
- [25] Shuai Yang, Jiaying Liu, **Wenhan Yang**, and Zongming Guo. "Perspective Distorted Video Restoration and Stabilization For Mobile Devices", *Proc. of IEEE China Summit and International Conference on Signal and Information Processing (ChinaSIP)*, Chengdu, China, Jul. 2015.
- [26] Saboya Yang, Jiaying Liu, **Wenhan Yang**, and Zongming Guo. "Sparse Representation Based Super Resolution Using Saliency and Edge Information", *Proc. of Asia Pacific Signal and Information Processing Association (APSIPA)*, Siem Reap, Cambodia, Dec. 2014.

## **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 bruch 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)

## ***HONORS AND PROFESSIONAL ACTIVITIES***

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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.

Reviewer for

- 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: Caffé, Lasagne, Pytorch, <i>etc.</i><br>11 years of programming experience in C, C++<br>10 years of programming experience (proficient) in MATLAB<br>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**

My Ph.D. supervisor

Professor, Institute of Computer Science & Technology

Peking University

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### **Dr. Jiaying Liu**

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### **Dr. Shuicheng Yan**

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Qihoo/360

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