

# Lantao Yu

---

## CONTACT INFORMATION

Department of Electrical and Computer Engineering, Rice University  
Room A226, Abercrombie Laboratories, Rice University, Houston, TX 77005  
☎ (+1) 832-289-4138  
✉ [lantao.yu@rice.edu](mailto:lantao.yu@rice.edu)  
📄 [complexfilter.github.io](https://github.com/complexfilter)

## RESEARCH INTERESTS

**Image Processing, Computational Photography, Computer Vision, Machine Learning**

## EDUCATION

**Rice University**, Houston, TX, USA 05/2016 - 12/2020  
• *Doctor of Philosophy*, in Electrical and Computer Engineering

**Rice University**, Houston, TX, USA 08/2012 - 04/2016  
• *Master of Science*, in Electrical and Computer Engineering

**Tianjin University**, Tianjin, CN 09/2008 - 07/2012  
• *Bachelor of Engineering*, in Measuring and Control Technology and Instrument (with honor)

## RELATED GRADUATE COURSEWORK

Computational Photography, Deep Learning, Data Mining & Statistical Learning, Introduction to Linear Programming, Advanced Topics in Optimization, Digital Signal Processing, Advanced Digital Signal Processing, Statistical Signal Processing

## PROFESSIONAL EXPERIENCE

**Rice University** Houston, TX, USA  
RESEARCH ASSISTANT WITH PROF. MICHAEL ORCHARD 01/2013 - PRESENT

**Research** on modeling the location-related and non-local features for image processing using complex-valued image presentation framework and manifold-inspired models. **Interest** in accurate edge detection for medical image analysis, image interpolation, aliasing mitigation for image display, image compression.

- Model non-redundant complex-valued coefficients for image compression [Ongoing].
- Propose world's first two-dimensional, non-redundant, multi-resolution, multi-directional complex-valued representation [8].
- Develop aliasing mitigation algorithms to increase display quality [Ongoing].
- Work on improving the selection of similar patches in extremely aliased regions for exploiting non-local similarity for image interpolation, with state-of-the-art PSNR [7].
- Develop parallel algorithm to exploit non-local similarity with improved selection of similar patches in mildly aliased regions for image interpolation [3, 4].
- Identify the accurate locations of edges for quantifying the motion of human retinal imagery, with sub-pixel accuracy [2].
- Unravel aliased co-located bands of coefficients for reconstructing the interpolated images [1].

**Facebook, Inc** MENLO PARK, CA, USA  
RESEARCH INTERN WITH DR. TODD KEELER 06/2020 - 08/2020

**Test** and implement deep learning-based optical flow estimation algorithms on neural processing unit (NPU) for virtual reality (VR) headset.

- Test the runtime of well-known FlowNet, FlowNet-2, RAFT algorithms on GPU and NPU.
- Develop the optimal downsampling operator in terms of prediction accuracy.
- Address the blocky artifacts of RAFT.
- Optimize RAFT with shorter runtime and acceptable prediction error.

#### **Mitsubishi Electric Research Laboratories**

CAMBRIDGE, MA, USA

RESEARCH INTERN WITH DR. DEHONG LIU

05/2019 - 08/2019

**Research** on blind fusion for remote-sensing multi-spectral and panchromatic images [5, 6].

- Propose a novel, state-of-the-art model for estimating the blur kernel coefficients.
- Propose a state-of-the-art pansharpening model for estimating high-resolution multi-spectral images.
- Build novel models for dehazing remote-sensing imagery.
- One patent filed on blind multi-spectral image fusion [P1].

**SKILLS** Python, MATLAB, PyTorch, C++

**SELECTED PUBLICATIONS**

[8] Lantao Yu and Michael T. Orchard, “Complex-Valued Image Modeling and its Applications to Image Compression”, IEEE Transactions on Image Processing, to be submitted.

[7] Lantao Yu and Michael T. Orchard, “Manifold-Inspired Single Image Interpolation”, IEEE Transactions on Image Processing, to be submitted, 2021.

[6] Lantao Yu, Dehong Liu, Hassan Mansour, Petros T. Boufounos, “Fast and High-Quality Blind Multi-spectral Image Pansharpening”, IEEE Transactions on Geoscience and Remote Sensing, under review, 2021. Arxiv: <https://arxiv.org/abs/2103.09943>.

[5] Lantao Yu, Dehong Liu, Hassan Mansour, Petros T. Boufounos, and Yanting Ma, “Blind Multi-spectral Image Pan-sharpening”, *Proc. ICASSP*, 2020.

[4] Lantao Yu and Michael T. Orchard, “When Spatially-Variant Filtering Meets Low-Rank Regularization: Exploiting Non-Local Similarity for Single Image Interpolation”, *Proc. ICIP*, 2019.

[3] Lantao Yu and Michael T. Orchard, “Single Image Interpolation Exploiting Semi-Local Similarity”, *Proc. ICASSP*, 2019.

[2] Lantao Yu and Michael T. Orchard, “Accurate Edge Location Identification Based on Location-directed Image Modeling”, *Proc. ICIP*, 2019.

[1] Lantao Yu and Michael T. Orchard, “Location-directed Image Modeling and its Application to Image Interpolation”, *Proc. ICIP*, 2018.

**PATENTS** [P1]. Dehong Liu, Lantao Yu, Hassan Mansour, Petros Boufounos, Yanting Ma, “Systems and Methods for Blind Multi-Spectral Image Fusion”, Filed, 2020.

**HONORS AND AWARDS**

<b>National Scholarship</b> from Ministry of Education of China	09/2011
<b>Rice Graduate Fellowship</b> from Rice University	08/2012 - 05/2013
<b>Rice Engineering Alumni Travel Award</b> from Rice University	02/2019, 09/2019
<b>Travel Award</b> from IEEE Signal Processing Society	10/2018
<b>Honorable Mention in Mathematical Contest in Modeling</b> from COMAP	02/2012

**PAPER REVIEW** IEEE Transactions on Image Processing, IEEE Transactions on Multimedia, ICASSP 2021

## REFERENCES

Prof. Michael Orchard, Rice University

Dr. Dehong Liu, Mitsubishi Electric Research Laboratories

[orchard@rice.edu](mailto:orchard@rice.edu)

[liudh@merl.com](mailto:liudh@merl.com)