Lantao Yu

Contact Information

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Research Interests

Image Processing, Computational Photography, Computer Vision, Machine Learning

Education

Rice University, Houston, TX, USA
- *Doctor of Philosophy*, in Electrical and Computer Engineering 05/2016 - 12/2020
- *Master of Science*, in Electrical and Computer Engineering 08/2012 - 04/2016

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, 2021 (accepted). 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

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

PAPER REVIEW

IEEE Transactions on Image Processing, IEEE Transactions on Multimedia, ICASSP 2021

REFERENCES

Prof. Michael Orchard, Rice University orchard@rice.edu
Dr. Dehong Liu, Mitsubishi Electric Research Laboratories liudh@merl.com