Qiuliang Ye

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Education

The Hong Kong Polytechnic University, 01/2019 - 07/2023 (Expected)

Ph.D. in Electronic and Information Engineering
Dissertation title: Robust Phase Retrieval Using Optimization and Deep Learning Techniques.
Supervisor: *Dr. Daniel Pak-Kong Lun*

- GPA: 3.90/4.00, General Research Fund

Guangdong University of Technology, 09/2014 - 06/2018

Bachelor of Science in Information Engineering, *Graduated with distinction.*
Supervisor: *Prof. Bingo Wing-Kuen Ling*

- GPA: 4.03/5.00 **(1/202)**
- National Scholarship 2014-2015 **(1/800)**, Outstanding Student Scholarship 2014-2018 **(1/52)**

Project Experience

Deep Learning-Based Phase Imaging System 08/2021 - 08/2022

- Challenges for traditional phase retrieval: 1. multiple coded measurements - undesirable for dynamic objects; 2. coded apertures generation - expensive devices; 3. iterative algorithm - time-consuming.
- Independently developed a single-shot defocus-based phase imaging system including design, purchase, and building. Design the imaging pipeline to capture measurements and do the post-processing with Python SDK. Defocus kernel can effectively mitigate the camera saturation **(8.3 dB better than without defocus)**, which is implemented by simple movement thus **no expensive device is needed**.
- Proposed an attention-based end-to-end convolutional neural network. The inference speed is **more than** 1000 **times faster** than iterative algorithms. The method outperforms existing iterative algorithms **(15.7 dB)** and learning-based methods **(1.8 dB)**. **(Published in Optics Express, 2022)**
- Developed a physics-driven multi-scale convolutional neural network based on physical information. The method designs a scale-adaptive feature fusion block. It embeds the unfolded iterative engine and physical domain knowledge into the attention structure that effectively leads to better performance. The method outperforms existing iterative algorithms **(27.3 dB)** and learning-based methods **(4.9 dB)** on simulated environment and optical system. **(Submitted to Trans. on Image Proc., 2022)**

Coded Phase Imaging System Design 11/2018 - 09/2021

- Challenges for traditional coded apertures: 1. continuous variables - not physically realizable; 2. not for real-world imaging systems (non-bandlimited property, quantization error, dynamic range, etc.).
- Independently developed two coded phase imaging systems including design, purchase, and building. Design the imaging pipeline to capture measurements and do the post-processing with Python SDK.
- Proposed a green-noise masking scheme for codded phase retrieval based on halftoning. The method effectively mitigates the high-frequency leakage due to non-bandlimited property of the optical imaging system, and it **outperforms existing coded apertures (1.6 dB)**. **(Published in OLE, 2021)**
- Developed an optimal multiple-level coded aperture based on two-stage optimization algorithm. Starting from practical constraints, the method firstly derives a continuous variable from a gradient descent algorithm then enables it in the real-world systems via a quick-search quantization. The theoretical guarantee is also provided. The method **significantly outperforms existing coded apertures on real-world imaging systems (up to 13.8 dB)**. **(Submitted to Trans. on Signal Proc., 2022)**

Skills

Programming	Python (proficient), MATLAB (proficient), LaTeX(proficient), C
Software & Tools	Pytorch, Visualisation(e.g. matplotlib, imagesc), Data handling/analysis(e.g. numpy, pandas), Optical Imaging System (e.g. design, purchase, build, collect, process), Cloud Platform(e.g. Tencent, Alibaba, AutoDL), Office, Linux & Windows (ALL proficient)
Soft Skills	Decision-Making & Problem-Solving(conduct the **multiple-disciplinary** (involving hardware & software) research topic myself) (Expert), Teamwork(cooperate with labmate on two research papers) (Expert), Communication(teaching assistant of 10+ courses: grading, lab sessions monitor, tutorials) (Proficient)
Language	Cantonese (Native), Mandarin (Native), English (proficient)

Publications

1. **Qiuliang Ye***, Daniel Pak-Kong Lun, Bingo Wing-Kuen Ling, and Li-Wen Wang. Optimal coded diffraction patterns for practical phase retrieval. *submitted to IEEE Trans on Signal Processing*, 2022
2. **Qiuliang Ye***, Li-Wen Wang, and Daniel Pak-Kong Lun. Towards practical single-shot phase retrieval with physics-driven deep neural network. *arXiv:2208.08604, submitted to IEEE Trans on Image Processing*, 2022
3. **Qiuliang Ye***, Li-Wen Wang, and Daniel P. K. Lun. SiSPRNet: end-to-end learning for single-shot phase retrieval. *Opt. Express*, 30(18):31937–31958, Aug 2022
4. **Qiuliang Ye**, Yuk-Hee Chan, Michael G Somekh, and Daniel PK Lun. Robust phase retrieval with green noise binary masks. ***Optics and Lasers in Engineering***, 149:106808, 2022
5. **Qiuliang Ye**, Chris YH Chan, Michael G Somekh, and Daniel PK Lun. Coded diffraction pattern phase retrieval with green noise masks. In *International Workshop on Advanced Imaging Technology (IWAIT) 2022*, volume 12177, pages 161–166. SPIE, 2022
6. **Qiuliang Ye**, Bingo Wing-Kuen Ling, Daniel PK Lun, and Weichao Kuang. Parallel implementation of empirical mode decomposition for nearly bandlimited signals via polyphase representation. ***Signal, Image and Video Processing***, 14(2):225–232, 2020
7. Xiaozhu Mo, Bingo Wing-Kuen Ling, **Qiuliang Ye**, and Yang Zhou. Linear phase properties of the singular spectrum analysis components for the estimations of the rr intervals of electrocardiograms. ***Signal, Image and Video Processing***, 14(2):325–332, 2020
8. Zheng Li, **Qiuliang Ye**, Yitong Guo, Zikang Tian, Bingo Wing-Kuen Ling, and Ringo Wai-Kit Lam. Wearable non-invasive blood glucose estimation via empirical mode decomposition based hierarchical multiresolution analysis and random forest. In *2018 IEEE 23rd International Conference on Digital Signal Processing (DSP)*, pages 1–5. IEEE, 2018
9. Faxian Cao, Zhijing Yang, Mengying Jiang, Weizhao Chen, **Qiuliang Ye**, and Wing-Kuen Ling. Spectral-spatial classification of hyperspectral image using extreme learning machine and loopy belief propagation. In *2017 IEEE International Conference on Internet of Things (iThings) and IEEE Green Computing and Communications (GreenCom) and IEEE Cyber, Physical and Social Computing (CPSCom) and IEEE Smart Data (SmartData)*, pages 1061–1064. IEEE, 2017

*** denotes the corresponding author.**

Interests

Volunteering, **Reading**, Trekking, Hiking, Photography, Trail & Road Running, Cooking, Power Lifting