Chengshuai Yang

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Machine Learning Research

AGI | NLP | Multimodal | Diffusion Models | Reinforcement Learning

AGI enthusiast with 9 years of solid computer experience, over 20 publications in venues like ECCV, IJCV, Optica, and Physical Review Letters. Strong foundation in math, statistics, and physics. Proficient in various machine learning algorithms and effective in iterative processes.

Work Experience

Postdoctoral Scholar in machine learning -- University of California, Los Angeles   Oct. 2021-Present

- Led the Large Language Models (NLP) project.
  - Supervised multi-model chain of thought reasoning GPT.
  - Conducted prompt engineering with ChatGPT(3.5 and 4), Bard, Bing, AutoGPT, Dolly, and Vicuna.
  - Applied LLM methodology to light field tomography (LIFT).
  - Authored a comprehensive series on Large Language Models (LLMs).
- Led the machine learning project for light field tomography (LIFT).
  - Achieved practical LIFT reconstruction by combining diffusion models and fine-tuning.
  - Improved LIFT reconstruction accuracy with GANs in deep unfolding.
  - Developed unsupervised learning and meta learning for LIFT.
- Lead the hyperspectral imaging deep learning project.
  - Built the practical reconstruction of hyperspectral imaging by embedding transformer and FastDVDnet into diffusion models based on optimization.
- Built a server platform by maintaining Linux systems and managing common Linux accounts based on SSH and VScode.
- Skills: Cloud, Pytorch, TensorFlow, prompt engineering, fine-tuning, meta learning, unsupervised learning, GAN, diffusion model, optimization, 3D reconstruction, python, C/C++, Java, SQL.

Machine learning optics team leader– Westlake University   Oct. 2020- Sep. 2021

- Established a machine learning optics team by recruiting PhD students and research assistants based on research background and interviews.
- Built a server platform by purchasing five servers with ten GPUs, collaborating with engineers, and maintaining Linux systems.
- Conducted reinforcement learning research.
- Led the project on ensemble learning for snapshot compressive imaging.
  - Achieved publication in ECCV 2022 by implementing scalable learning and high-speed strategies.
- Led the project on play and plug for demosaicing snapshot compressive imaging.
  - Pioneered the online training method to improve play and plug performance, published in the International Journal of Computer Vision (IJCV).
- Led the project on unsupervised learning for compressed ultrafast photography.
- Skills: server, Pytorch, Tensorflow, GAN, reinforcement learning, diffusion model, optimization, deep unfolding, demosaicing, 3D reconstruction, unsupervised learning.

Education

Postdoctoral Training—University of California, Los Angeles   Oct. 2021 –

Major: Machine Learning (minor: Optical Imaging)

Ph.D. – East China Normal University   Sep.2015 -Jun.2020

Major: Optical Imaging (minor: Machine Learning)

Bachelor –Nantong University   Sep.2011 -Jun.2015

Major: Applied Physics (minor: Computer Science)

Research Interests

NLP, LLM, AGI, Reinforcement Learning, Diffusion Models, Deep Unfolding, Multi-Model, Optimization, Plug and Play (PnP), Point Clouds, Graph Neural Network, Meta Learning, Super Resolution, Compressed Sensing (CS), VR and AR, Light Field Photography (LIFT), Compressed Ultrafast Photography (CUP), Single Pixel Camera (SPC) and SLAM.

Professional Skills

Programming language: Python, C, C++, Java, Matlab

Deep learning frameworks: Pytorch, Tensorflow, Caffe.

Others: Latex, Git, Docker, Sketchup, Hexo, Origin, AT89C51 single-chip computer

Language: Chinese (native), English (working proficiency)

Publications

- **<u>Chengshuai Yang</u>**, etc. Supervised multi-model chain of thought reasoning GPT. **In progress** (2023).

- **<u>Chengshuai Yang</u>**, Shiyu Zhang, Xin Yuan. Ensemble learning priors unfolding for scalable Snapshot Compressive Sensing. In **ECCV** 2022.

- Zongliang Wu*, **<u>Chengshuai Yang</u>***, Xionfei Su and Xin Yuan. Adaptive Deep PnP Algorithm for Video Snapshot Compressive Imaging. **International Journal of Computer Vision** (2023): 1-18. (Co-first-author).

- **<u>Chengshuai Yang</u>**, etc. High-fidelity image recfirst authorfor compressed ultrafast photograhphy via augmented-lagrangian and deep-learning hybrid algorithm. **Photonics Research** 9(2), B30-B37 (2021).

- **<u>Chengshuai Yang</u>**, etc. Hyperspectrally compressed ultrafast photography. **Physical Review Letters**, 124, 023902 (2020).

- **<u>Chengshuai Yang</u>**, etc. Optimizing codes for compressed ultrafast photography by genetic algorithm. **Optica** 5(2), 147-151 (2018).

- Xiaoxi Du, Yosef Koronyo, Nazanin Mirzaei, **<u>Chengshuai Yang</u>**, Dieu-Trang Fuchs, Keith L Black, Maya Koronyo-Hamaoui, Liang Gao. Label-free hyperspectral imaging and deep-learning prediction of retinal amyloid β-protein and phosphorylated tau. **PNAS nexus** 1.4 (2022): pgac164.

- **<u>Chengshuai Yang</u>**, Dalong Qi, Fengyan Cao, Yilin He, Pengpeng Ding, Tianqing Jia, Shixiang Xu, Zhenrong Sun and Shian Zhang, Single-shot and receive-only ultrafast electro-optical deflection imaging. **Physical Review Applied**, 13, 024001 (2020).

- **<u>Chengshuai Yang</u>**, Yuyang Ding, Jinyang Liang, Fengyan Cao, Dalong Qi, Tianqing Jia, Zhenrong Sun, Shian Zhang, Wei Chen, Zhenqiang Yin, Shuang Wang, Zhengfu Han, Guangcan Guo, and Lihong V. Wang, Compressed three-dimensional image information and communication security. **Advanced Quantum Technologies** 1800034, 1-8 (2018).

- **<u>Chengshuai Yang</u>**, Dalong Qi, Jinyang Liang, Xing Wang, Fengyan Cao, Yilin He, Xiaoping Ouyang, Baoqiang Zhu, Wenlong Wen, Tianqing Jia, Jinshou Tian, Liang Gao, Zhenrong Sun, Shian Zhang, and Lihong V. Wang, Improving temporal and spatial resolutions of compressed ultrafast photography by using multi-encoding imaging. **Laser Physics Letters** 15(11),116202 (2018).

- **<u>Chengshuai Yang</u>**, Dalong Qi, Fengyan Cao, Yilin He, Xing Wang, Wenlong Wen, Jinshou Tian, Tianqing Jia, Zhenrong Sun and Shian Zhang, Improving the image reconstruction quality of compressed ultrafast photography via an augmented Lagrangian algorithm. **Journal of Optics** 035703，1-7 (2019).

- Dalong Qi, **<u>Chengshuai Yang</u>**, Fengyan Cao, Jinyang Liang, Yilin He, Yan Yang, Tianqing Jia, Zhenrong Sun, and Shian Zhang, Compressed ultrafast electron diffraction imaging through electronic encoding. **Physical Review Applied** 054061(10),1-9 (2018).

- Fengyan Cao, **<u>Chengshuai Yang,</u>** Dalong Qi, Jiali Yao, ilin He, Xing Wang, Wenlong Wen, Jinshou Tian, Tianqing Jia, Zhenrong Sun, and Shian Zhang. Single-shot spatiotemporal intensity measurement of picosecond laser pulses with compressed ultrafast photography, **Optics and Lasers in Engineering** 116,89-93 (2019).

- Yongmei Yang, Yulong Li, Zanyang Guan, **<u>Chengshuai Yang,</u>** Shian Zhang, Feng Wang, and Qingshuai Li. A diagnostic system toward high-resolution measurement of wavefront profile,**Optics Communications** 456,1-6 (2020).

Referee/Reviewer for Professional Journals

1. **Referee/Reviewer for** *Pattern Recognition*
2. **Referee/Reviewer for** *Photonics Research*

Rewards and Honors

- Outstanding Ph.D. in East China Normal University (ECNU).   Jun. 2020
- Future Scientist Development Program in ECNU.   Mar. 2019
- Academic Innovation Promotion Program for Excellent Doctoral Students in ECNU.

Jul. 2018

- Outstanding undergraduate in Nantong University   Jun. 2015
- Excellent Undergraduate Thesis in Nantong University   Jun. 2015
- The First Class Scholarship for Undergraduate in Nantong University   Oct. 2014
- Pacemaker to Merit Student in Nantong University   Oct. 2014
- The First Prize of Undergraduate Students' Physics and Experimental Technology Works
   Innovation Competition in Jiangsu Province   Nov. 2013
- Computer software level 3 in Jiangsu province   Dec. 2013
- Level 2 Visual Basic of Computer science in Jiangsu Provincial Colleges and Universities   Dec. 2012
- Level 2 C programming language of Computer science in National Colleges and Universities   Sep. 2013
- Level 3 hardware of Computer science in Jiangsu Provincial Colleges and Universities   May. 2013
- Level 3 Software of Computer science in Jiangsu Provincial Colleges and Universities   Dec. 2013
- The First Prize of Advanced Mathematics Contest in Jiangsu Province

Jul. 2012

Activities

- Bibles study in university cooperative housing association, Los Angeles.   Jun.2022 -
- Future Scientist Development Program in ECNU.   Mar. 2019-Jan. 2021
- Academic Innovation Promotion Program for Excellent Doctoral Students in ECNU.

Jul. 2018-Jun. 2020

- College student training program based on single-chip computer and C programming language in Nantong University.

Mar. 2013-June. 2014