HAOZHU WANG

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PROFESSIONAL EXPERIENCE

ML Research Scientist Jan 2022 - Now
3M

· Research on medical scribe with natural language understanding.

AI Research Intern June 2021 - Nov 2021
3M

· Research on offline meta-reinforcement learning.

EDUCATION

Ph.D. in Electrical & Computer Engineering (Machine Learning Track) Apr 2016 - Dec 2021
University of Michigan, Ann Arbor, USA

· Research interests: reinforcement learning, AI for science, machine learning for healthcare. GPA: 3.95/4.00.
· Dissertation: *Learning to Optimize: Applications in Physical Designs and Manufacturing*

B.Eng. in Electrical Engineering Aug 2011 - July 2015
Tianjin University & Nankai University, Tianjin, China

· GPA: 3.90/4.00.
· National Scholarship (1 in 65).

Visiting Student Jan 2015 - Jun 2015
MIT, Boston, USA

· Visiting student in Quantum Nanostructures and Nanofabrication Group.

RESEARCH & INDUSTRY EXPERIENCE

Reinforcement Learning and Hybrid Machine Learning & Optimization Methods for Automatic Optical Design Jan 2020 - Dec 2021
University of Michigan & Inlight Technology

· Developed customized sequence generation model based on GRU for generating multi-layer optical designs.
· Trained sequence generation models with PPO algorithm for automatically designing multi-layer optical thin films with target spectrum.
· Developed a hybrid machine learning and optimization algorithm called Neural Particle Swarm Optimization for highly accurate and efficient structural color designs.
· Designed environmentally friendly alternatives for chrome coatings with the developed algorithm.
· Filed 2 patents based on the proposed algorithms.

Patient Risk Stratification with Individual Treatment Effect Sep 2018 - Jan 2020
University of Michigan

- Proposed a patient risk stratification method based on estimating individual treatment effect under resource constraint settings.
- Cleaned and processed patient EHR data for training patient risk stratification models.
- Developed method outperforms conventional patient risk stratification methods on a real EHR dataset collected at University of Michigan.

Treatment Planning for Occupational Injury Jan 2018 - Dec 2019
University of Michigan

- Cleaned and analyzed an insurance claim dataset with 1.25 million patient records.
- Trained deep learning models for predicting return to work.
- Learned treatment policies with Q-learning from observational data.
- Evaluated the learned policies with weighted importance sampling.
- Learned policy outperformed clinicians' policy.

Deep Neural Network Compression Aug 2017 - Jan 2018
University of Michigan

- Implemented ordered weighted ℓ_1 (OWL) and group OWL (GrOWL) regularized deep neural networks in Tensorflow.
- Investigated sparsity inducing and correlation discovering properties of GrOWL for both convolutional layers and fully connected layers of deep neural network.
- Proposed algorithm improved the stability in model compression.
- Successfully compressed LeNet-5 and VGG-16 for more than 10 times.

PUBLICATIONS

Taigao Ma, Mustafa Tobah, **Haozhu Wang***, L. Jay Guo*. Benchmarking deep learning-based models on nanophotonic inverse design problems. Opto-Electronic Science, 2022. (*: correspondence)

Haozhu Wang, L. Jay Guo. Neutron: Neural Particle Swarm Optimization for Material-Aware Inverse Design of Structural Color. *Available at SSRN 3992098*, 2022.

Hanfa Song, **Haozhu Wang**, and Vien Van. An Analytical Method for Evaluating the Robustness of Photonic Integrated Circuits. *Journal of Lightwave Technology*, 2022.

Haozhu Wang , Zeyu Zheng, Chengang Ji, L. Jay Guo. Automated Optical Multi-layer Design via Deep Reinforcement Learning. *Machine Learning: Science and Technology*, 2021.

Erkin Otles, **Haozhu Wang**, Suyanpeng Zhang, Brian Denton, Jon Seymour, Jenna Wiens. Return to Work After Injury: A Sequential Prediction & Prescription Problem. *Machine Learning for Healthcare (Clinical Abstract)*, 2019.

Dejiao Zhang*, **Haozhu Wang***, Mario A.T.Figueiredo, Laura Balzano. Learning to Share: Simultaneous Parameter Tying and Sparsification in Deep Learning, *International Conference on Learning Representations* (ICLR), 2018. (*: co-first author)

Jiaxuan Wang, Jeeheh Oh, **Haozhu Wang**, Jenna Wiens. Learning Credible Models. *Proceedings of the 24th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining,* 2018.

Haozhu Wang, Jeeheh Oh, Eric Horvitz, Jenna Wiens. Targeting Interventions: Improving Estimates for Individual Treatment Effects by Explicitly Modeling Intermediate Events. (Under review)

Jiaxuan Wang, **Haozhu Wang**, Fahad Kamran, Jenna Wiens. Exploiting Spatial and Temporal Invariances when Mining Player Tracking Data in Basketball. (Under review)

Zhao, Qing-Yuan, Di Zhu, Niccolò Calandri, Andrew E. Dane, Adam N. McCaughan, Francesco Bellei, **Hao-Zhu Wang**, Daniel F. Santavicca, and Karl K. Berggren. "Single-photon Imager Based on a Superconducting Nanowire Delay Dine." *Nature Photonics* 11, no. 4 (2017): 247-251.

Wenqi Zhu, Ting Xu, **Haozhu Wang**, Cheng Zhang, Agrawal Amit, Deotare Parag, Henri Lezec. "Surface-Plasmon-Polariton Laser based on a Metallic Trench Fabry-Perot Resonator", *Science Advances* (2017).

Wang Haozhu, Yang Fenghe, Yang Fan, Nie Meitong, Yang Jianjun. Investigation of Femtosecond-Laser Induced Periodic Surface Structure on Molybdenum. *Chinese Journal of Lasers*, 42(1), 0103001 (2015).

SKILLS

Programming Languages: Python, C++, Java, MATLAB, Julia, R

Frameworks & Others: PyTorch, TensorFlow, Keras, Linux, Bash, SQL, Hadoop, Google Cloud Platform, AWS

AWARDS

Rackham Graduate Research Grant ($3000), University of Michigan, 2020

Rackham Graduate Travel Grant ($1200), University of Michigan, 2018

Outstanding Graduate Award, Tianjin University, 2015

National Scholarship, Chinese Ministry of Education, 2014

Kitano Foundation of Lifelong Integrated Education Scholarship, Nankai University, 2013

Grand Prize of Physics Competition for College Students, Tianjin, 2013

First Tier Scholarship, Nankai University, 2012

REVIEWING SERVICE

Conference: ICML'22, ICLR'22, AutoML-Conf'22, NeurIPS'20-21, MLHC'18-21, AMIA'20-21, NeurIPS'20 Meta-learning Workshop, NeurIPS'21 Machine Learning and Physical Science Workshop
Journal: Journal of Physics Communications, AIP Advances

TEACHING AND MENTORING

Graduate student instructor

- EECS 442 Introduction to Computer Vision, Fall 2020
- EECS 504 Computer Vision, Winter 2020
- EECS 545 Machine Learning, Fall 2017
- Multidisciplinary Design Program, College of Engineering, Univeristy of Michigan, 2020 - 2021

Student mentees

- Zhangxing Bian, current position: Ph.D. student at Johns Hopkins University
- Taigao Ma, current position: Ph.D. student at University of Michigan
- Mustafa Tobah, current position: Ph.D. student at University of Michigan
- Suyanpeng Zhang, current position: Ph.D. student at University of Southern California
- Yuxi Xie, current position: master student at University of Michigan
- Jiazhen Zhao, current position: undergraduate student at University of Michigan
- Tex White, current position: undergraduate student at University of Michigan
- Diego Tejada, current position: undergraduate student at University of Michigan
- Khoa Bang Tran, current position: undergraduate student at University of Michigan