Huizhuo (Angela) Yuan

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Education

- **University of California, Los Angeles** — Los Angeles, CA
  MS in Computer Science, Dept. of Computer Science, Samueli School Of Engineering — *Sep. 2022 — Present*
- **University of California, Berkeley** — Berkeley, CA
  Academic Visitor, Dept. of Electrical Engineering and Computer Sciences — *Jul. 2020 — Jun. 2022*
  - Remotely visited RISELAB hosted by Prof. Michael I. Jordan, and conducted research in machine learning theory including stochastic optimization, dynamical systems as continuous limits, reinforcement learning, etc.
  - Conducted research in reinforcement theory, especially in a general framework for function approximations in reinforcement learning that nearly includes all existing RL models with sharp regret bounds, in collaboration with Prof. Quanquan Gu's research lab (UCLA)
  - Auditing online courses, lectures and seminars via Zoom, including EE290 (Theory of Reinforcement Learning), EECS227C (Convex Optimization), STAT210B (High-Dimensional Statistics), etc.
- **Peking University** — Beijing, China
  PhD in Statistics, Dept. of Probability & Statistics, School of Mathematical Sciences — *Aug. 2013 – Jul. 2019*
  - Conducted research in optimization, reinforcement learning, deep learning and generative models
  - Visiting member of the Center for Data Science, Peking University
  - Dissertation Title: Variance Reduction Method and ADMM in Statistical Learning and Application in Medical Imaging Problems

  BS in Mathematics, Dept. of Mathematics, School of Mathematical Sciences — *Aug. 2009 – Jun. 2013*
  - Entered college from experimental high school program for gifted young (1%) in Beijing
  - Completed upper-division coursework in functional analysis, convex optimization, stochastic processes, stochastic calculus, statistical machine learning, etc.
  - Dissertation Title: On Restrictive Conjecture of Fourier Transform

Professional Experiences

- **Mila** — Montréal, Québec, Canada
  Summer Visitor, Mila — *Jun. 2022 – Aug. 2022*
  - Visited Prof. Gauthier Gidel's research lab at Mila, a leading AI research institute worldwide, among other members in Montréal's group of machine learning and optimization
  - Conducted research in minimax optimization, including rate-optimal analysis for bilinearly coupled saddle point problems, and new gradient dynamics analyses of nonconvex-nonconcave with hidden convex-concave structure
- **Proprietary Trading** — Shanghai, China
  Intern in Financial Strategies, Lab of Proprietary Trading — *Jul. 2019 – Jun. 2020*
  - Collaborated on improving the programming and simulating system for trading signals, specifically for high-frequency stock data, using primarily C++ and Python
  - Designed and programmed price signals in C++ with improved processing efficiency and $\approx$1% prediction accuracy improvement on Chinese future market data, such as Rb and Cu
  - Employed feature selection for improving the accuracy of a prediction made by existing signals, via feature selection methods exemplified by weighted Ridge/Lasso-type regularized linear regression
- **Tencent Technology** — Shenzhen, China
  Intern in Reinforcement Learning, Tencent AI Lab — *Aug. 2018 – Jun. 2019*
  - Presented an analysis of variance-reduced (SVRG, SPIDER, and SARAH) first-order stochastic optimization algorithms on its practical applications to the policy gradient algorithms in reinforcement learning (TRPO and PPO algorithms). Algorithmic performance was empirically justified for RL training, while the continuous dynamics of the algorithms (for SARAH) were used to theoretically analyze their convergence.
    Published a paper in NeurIPS 2018 Workshop in Deep Reinforcement Learning

- Proposed a novel algorithm that achieves desirable theoretical performance in solving stochastic compositional optimization problems; developed a recursive variance-reduced algorithm with a single-loop structure utilized to optimize a two-layer objective function. Verified the algorithmic efficiency over previous results via experimental studies. Published a paper in NeurIPS 2019
- Analyzed the limiting behavior of one of the first-order methods (the alternating direction method of multipliers) and several of its variants under non-smooth settings. Justified the correspondence between discrete algorithms and its differential inclusion counterparts, both theoretically and empirically. Published a paper in ICML 2019

- **Horizon Robotics** Beijing, China
  Intern in Reinforcement Learning (RL), Horizon AI Lab *Mar. 2018 – Jul. 2018*
  - Implemented cutting-edge method (MAML, RL2, HRA, etc.) in meta-learning RL and hierarchical RL for tasks of Atari games and MuJoCo simulators

- **Peking University** Beijing, China
  Research Assistant, Deep Learning Laboratory, Center for Data Science *Jul. 2016 – Aug. 2018*
  - Developed a novel method called Automatic Object Detection Reinforcement Learning (AOD-RL) to obtain object-oriented state representations for video games, allowing the agents to automatically detect vital objects during their learning processes (no requirement of prior human knowledge)
  - Conducted empirical studies on the Battle City game to validate our method that achieves ≈95% average final rewards compared with the ground truth model, presenting a ≈15% improvement over the raw image inputs

- **Peking University** Beijing, China
  PhD Researcher, Dept. of Probability & Statistics, School of Mathematical Sciences *Aug. 2013 – Jul. 2019*
  - Conducted research in developing algorithms for reducing dose in CT image reconstruction, and proposed a hybrid deep learning approach that combines sinogram interpolation with image denoising
  - Achieved more accurate reconstructions via alternatively training the sinogram interpolation network and the image denoising network, in comparison with pure image denoising

Interests and Skills

- **Technical Skills and Competencies:** C++, MATLAB, Python, R, TensorFlow, PyTorch
- **Research Interests:** Optimization, Deep Learning, Reinforcement Learning

Publications

- **AISTATS 2023 Submission**
  Chris Junchi Li*, **Angela (Huizhuo) Yuan***(**α-β**), Gauthier Gidel, Michael I. Jordan (2022). "Nesterov Meets Optimism: Rate-Optimal Optimistic-Gradient-Based Method for Stochastic Bilinearly-Coupled Minimax Optimization." arXiv:2210.17550. Presented at NeurIPS 2022 OPT Workshop

- **ICLR 2023 Submission**
  Zixiang Chen*, Chris Junchi Li*, **Angela (Huizhuo) Yuan***(**α-β**), Quanquan Gu, Michael I. Jordan (2022). "A General Framework for Sample-Efficient Function Approximation in Reinforcement Learning." arXiv:2209.15634. Presented at NeurIPS 2022 Deep RL Workshop

- **Manuscript in Submission**
  Huizhuo Yuan, Xiangru Lian, Ji Liu, Yuren Zhou (2021). "Stochastic Recursive Momentum for Policy Gradient Methods." arXiv:2003.04302.

- **NeurIPS 2019** (α-β)
  Wenqing Hu, Chris Junchi Li, Xiangru Lian, Ji Liu, **Huizhuo Yuan** (2019). "Efficient Smooth Non-Convex Stochastic Compositional Optimization via Stochastic Recursive Gradient Descent." Advances in Neural Information Processing Systems (NeurIPS)

- **ICML 2019**
  Huizhuo Yuan, Yuren Zhou, Chris Junchi Li, Qingyun Sun (2019). "Differential inclusions for modeling nonsmooth ADMM variants: A continuous limit theory." International Conference on Machine Learning

- **CoG 2019**
  Yu Chen, **Huizhuo Yuan**, and Yujun Li (2019). "Object-oriented state abstraction in reinforcement learning for video games." 2019 IEEE Conference on Games (CoG)

- **NeurIPS 2018 Workshop**
  Huizhuo Yuan, Chris Junchi Li, Yuhao Tang, Yuren Zhou (2018). "Policy optimization via stochastic recursive gradient algorithm." Deep Reinforcement Learning Workshop NeurIPS

- **ISBI 2018**
  Yuan, Huizhuo, Jinzhu Jia, and Zhanxing Zhu (2018). "Sipid: A deep learning framework for sinogram interpolation and image denoising in low-dose ct reconstruction." 2018 IEEE 15th International Symposium on Biomedical Imaging (ISBI)

Honors and Awards

- **2022** NeurIPS Workshop Registration Award
- **2019** NeurIPS Travel Award
- **2019** ICML Travel Award
- **May. 2017** The Most Technical Difficulty Award, Schlumberger HackPKU
- **Nov. 2014** PKU Kwang-Hua Educational Scholarship, Kwang-Hua Educational Foundation
- **Nov. 2011** The Student Innovation Award, Department of Mathematics of Peking University
- **May. 2011** The First Prize (Meritorious Winning) for COMAP's Mathematical Contest in Modeling (MCM)
- **Dec. 2010** The Second Prize for the China Undergraduate Mathematical Contest in Modeling (Province Division), China Society for Industrial and Applied Mathematics (CSIAM)