CHENYU ZHANG

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EDUCATION

Columbia University *2022 - 2023 (expected)*

M.S. in Data Science
Overall GPA: 4.28/4

Relevant Courses

Reinforcement Learning	A+	Algorithms for Data Science	A+
Probability and Statistics for Data Science	A+	Exploratory Data Analysis	A+
Machine Learning	A	Modern Control Theory	A+
High-dimensional Probability	A	Computer Systems	A

Fudan University *2018 - 2022*

B.S. in Mathematics and Applied Mathematics
Honors Student of Su Buqing Top Talent Program
Overall GPA: 3.56/4

Relevant Courses

Numerical Linear Algebra and Optimization (H)	A	Deep Learning	A
Numerical Solution to Differential Equations	A	Methods of Optimization	A
Functions of Complex Variable	A	Probability Theory	A
An Introduction to Differential Manifolds (H)	A-	Advanced Algebra	A
Computational Thinking	A	Fundamentals of Mechanics	A

Relevant Seminars

Intelligent Optimization Algorithms	Convex Optimization
Complex Analysis	Global Differential Geometry
Differential Manifolds and Differential Topology	Differential Geometry of Curves and Surfaces
Non-Euclidean Geometry and Point Set Topology	Principles of Mathematical Analysis
Advanced Mathematical Analysis	

Shenzhen Middle School *2015 - 2018*

Honor Curriculum (Physics Olympiad)
Award: Chinese Physics Olympiad - First Class Award

PUBLICATIONS

- **Chenyu Zhang,** Rufeng Xiao, Wen Huang, and Rujun Jiang. Riemannian Trust Region Methods for SC^1 Minimization. *Journal of Scientific Computing,* 2023. [In review] [Preprint]

WORKING PAPERS

- **Chenyu Zhang,** Han Wang, James Anderson, and Aritra Mitra. Federated SARSA with Linear Function Approximation under Environmental Heterogeneity. 2023. [Ready to submit]
- **Chenyu Zhang,** Rujun Jiang, and Wen Huang. Iteration Complexity of Newton-Type Methods for Non-Convex Optimization with Hölder Continuous Hessian. 2023. [In progress]
- **Chenyu Zhang,** Qi Cai, Zhuoran Yang, and Zhaoran Wang. On Reward-Free Reinforcement Learning for POMDPs with Linear Function Approximation. [Ready to submit]

RESEARCH EXPERIENCE

Neural Networks *May 2023 - Present*

Research assistant, advised by Prof. John Wright of Dept. EE&APAM, Columbia University, NY

- Identified limitations of neural tangent kernels and designing optimizable data-aware kernels for neural networks.

Mean Field Games *May 2023 - Present*

Research assistant, advised by Prof. Sharon Di of Dept. CEEM, Columbia University, NY

- Developing sample-efficient model-free online reinforcement learning algorithms for mean field games.
- Designing multi-agent reinforcement learning systems able to handle large heterogeneous populations.

Federated Reinforcement Learning *September 2022 - Present*

Research assistant, advised by Prof. James Anderson of Dept. EE, Columbia University, NY

- Developed a novel federated SARSA algorithm and established its finite-time error bounds, as well as demonstrated its linear convergence speedups with the presence of environmental heterogeneity.
- Conducted three numerical experiments to verify the theoretical results of the federated SARSA algorithm.

Manifold Nonsmooth Nonconvex Optimization *October 2021 - September 2022*

Research assistant, advised by Prof. Rujun Jiang of Dept. Data Science, Fudan University, China
Co-advised by Prof. Wen Huang of Dept. Mathematics, Xiamen University, China

- Developed the first semismooth Riemannian trust-region method for nonsmooth nonconvex optimization problems on manifolds, and proved its convergence results including superlinear local convergence rate.
- Applied our semismooth Riemannian trust-region method to solve augmented Lagrangian methods' subproblem on manifolds, and demonstrated its superiority through three numerical experiments.
- Established an optimal iteration complexity $\tilde{O}(\epsilon^{-(2+\alpha)/(1+\alpha)})$ of Riemannian Newton-type methods with α-Hölder continuous Hessian.

Reinforcement Learning for POMDPs *March 2021 - January 2022*

Research assistant, advised by Prof. Zhaoran Wang, Dept. of IEMS&CS, Northwestern University, IL
Co-advised by Prof. Zhuoran Yang, Dept. of Stat&Data Science, Yale University, CT

- Designed a reward-free RL algorithm for linear POMDPs and established its sample efficiency guarantee.

TEACHING EXPERIENCE

Machine Learning *September 2023 - December 2023*

Teaching assistant, advised by Prof. Daniel Hsu of Dept. CS, Columbia University, NY

- Designed solutions for 5 homework assginments and 2 exams, grading over 800 student submissions.
- Hosted office hours each week, providing personalized guidance to 50+ students on complex topics.

Reinforcement Learning *September 2023 - December 2023*

Teaching assistant, advised by Prof. Shipra Agrawal of Dept. IEOR, Columbia University, NY

- Designed solutions for 5 homework assginments and 2 exams, grading over 800 student submissions.
- Hosted office hours each week, providing personalized guidance to 50+ students on complex topics.

Analysis of Algorithms *January 2023 - May 2023*

Teaching assistant, advised by Prof. Eleni Drinea of Dept. CS, Columbia University, NY

- Designed solutions for 5 homework assginments and 2 exams, grading over 800 student submissions.
- Hosted office hours each week, providing personalized guidance to 50+ students on complex topics.