Zhichao Jia

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EDUCATION

- **Johns Hopkins University** — Baltimore, MD
  Master of Science and Engineering in Applied Mathematics and Statistics; GPA: 4.0/4.0 — Sept. 2021 - Dec. 2022
  Thesis: *First-Order Methods for Nonsmooth Nonconvex Functional Constrained Optimization with or without Slater Points*
  Advisor: *Benjamin Grimmer*
  Courses: *Nonlinear Optimization, Stochastic Optimization, Large-Scale Optimization in Data Science, Control Theory, Statistical Theory*

- **Sun Yat-Sen University** — Guangzhou, China
  Bachelor of Science in Information and Computing Science; GPA: 3.7/4.0 — Sept. 2017 - Jun. 2021
  Thesis: *On an FFHE-Inspired Method for Effectively Solving Differential Riccati Equations*
  Advisor: *Tao Wang*
  Courses: *Real Analysis, Linear Algebra, Numerical Methods, Statistics, Optimization Methods, Machine Learning, Data Mining, Programming*

RESEARCH EXPERIENCE

- **Applications of the FFHE Method in Time-Varying Control Systems** — Sun Yat-Sen University, China
  Advisor: *Associate Professor Tao Wang* — Jan. 2020 - May 2021
  - **Applied to CTECQP**: Implement a tailored novel fast and flexible holomorphic embedding (FFHE) method for solving continuous-time equality constrained quadratic programming (CTECQP) problems.
  - **Applied to MDRE**: Extend the FFHE method to dealing with matrix differential Riccati equations (MDRE).
  - **Promotion on FFHE**: Carry out certain strategies to optimize the series expansion, rational approximation, adaptive segmentation and automatic correction for the FFHE method and achieve better performance.
    "On a Tailored Fast and Flexible Holomorphic Embedding Method for Time-Varying Control Systems" by Y. Ding, Z. Jia, Z. Fang, T. Wang, Y. Zhang, submitted to IEEE Trans on Auto Control.

- **The Augmented Lagrangian Method for Nonconvex Problems** — Carnegie Mellon University, PA (Online)
  Advisor: *Assistant Professor Jovan Ilic* — May 2020 - Jul. 2020
  - **Algorithm Realization and Experimental Analysis**: Implement the augmented Lagrangian method solving nonconvex optimization problems with equality constraints; Compare its performance under different choices of related hyper-parameters and with other classic constrained methods.
    "Implementation and Analyzing of Augmented Lagrangian Method" Abstract by Z. Jia, Z. Hu, J. Ma, accepted by ICAPM 2021 (presentation only).

- **First-Order Methods for Nonconvex Nonsmooth Constrained Optimization** — Johns Hopkins University, MD
  Advisor: *Assistant Professor Benjamin Grimmer* — Oct. 2021 - present
  - **Algorithm Design and Theoretical Analysis**: Present a modified inexactly proximally guided switching subgradient method solving nonconvex nonsmooth constrained optimization problems based on newly proposed Slater point-type assumptions and measurements of stationarity; Provide theoretical results on its convergence rates, feasibility guarantee and compactness assumption; Conduct numerical experiments on sparse phase retrieval problems.

- **The SPSA method for Constrained Stochastic Optimization** — Johns Hopkins University, MD
  Advisor: *Professor James Spall* — May 2022 - present
  - **SPSA-based Constrained Algorithms**: Propose an SPSA-based switch updating method and an SPSA-based random-search projection method built on the simultaneous perturbation stochastic approximation (SPSA) solving constrained stochastic problems under specific assumptions; Show convergence results and numerical performance of them.
  - **Distributions of SPSA Sampling**: Generate computational and experimental results on the advantages of non-Bernoulli distributions compared to using Bernoulli distribution in SPSA sampling for specific constrained cases.

- **Stochastic Gradient Descent Methods with Stochastic Polyak Stepsizes** — Johns Hopkins University, MD
  Advisor: *Assistant Professor Nicolas Loizou* — Jun. 2022 - present
  - **SPS in Different Problem Settings**: Apply two variants of stochastic Polyak stepsizes (SPS) to the stochastic gradient descent method solving weakly convex and sharp stochastic optimization problems and present their convergence results.
  - **SPS in Constrained Algorithms**: Apply one variant of SPS to the stochastic switching subgradient method solving constrained stochastic optimization problems and present its convergence result.

AWARDS

- Third Prize of China Undergraduate Mathematical Contest in Modeling (top 40%) in Sept. 2019

- Ranked 6th in Datathon@LISH in Feb. 2022

SKILLS

- **Programming Languages**: C, C++, Python, Matlab, SQL, R