

ZHENGHAO XU

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Education

Zhejiang University - College of Computer Science and Technology

Sep. 2018 – Present

Bachelor of Engineering in Computer Science and Technology

Hangzhou, Zhejiang

- Chu Kochen (CKC) Honors College member (700 selected from 6,400)
- Minor in Mathematics and Applied Mathematics
- GPA: 3.92/4.00 (89.90/100) (top 3%)

Relevant Coursework

- **Theory:** Functional Analysis (97), Ordinary Differential Equations (91), Differential Geometry (93), Introduction to Applied Operations Research (97), Introductory Lectures on Optimization (96), Numerical Analysis, Probability Theory & Mathematical Statistics, Stochastic Process
- **Application:** Computer Vision (98), Machine Learning Algorithms and Applications, Artificial Intelligence

Honors & Awards

- Zhejiang Provincial Government Scholarship (twice, top 15% in CKC) 2019, 2020
- Second-Class Scholarship for Elite Students in Basic Disciplines (CKC Honors College) (top 20% in CKC) 2019

Research Experience

Algorithms for Equitable and Optimal Transport (EOT) | UC Davis

Oct. 2021 – Present

Research Intern

Davis, California (remote)

Advisor: Prof. Shiqian Ma | Department of Mathematics, UC Davis

- Studied the projected alternating maximization (PAM) algorithm and extrapolation variant (PAME) for EOT.
- Participated in designing faster algorithms with acceleration for EOT.

Exact Worst-Case Performance of Bregman Methods | UC Davis

Jul. 2021 – Present

Research Intern, UC Davis GREAT Program Participant

Davis, California (remote)

Advisor: Prof. Shiqian Ma | Department of Mathematics, UC Davis

- Solved the performance estimation problems (PEP) in semidefinite programming (SDP) form for Bregman proximal gradient (BPG) and Bregman proximal point (BPP) methods. Obtained tight upper bounds of the two methods for relatively smooth convex composite optimization problem respectively.
- Derived the PEP of Bregman Halpern's algorithm for Bregman strongly non-expansive operators. Recovered the upper bound on convergence rate of degenerated Halpern's iteration and illustrated unboundedness of general case.
- Derived exact worst-case performance bound of BPG through PEP with additional relatively strongly convex condition.
- Extended the PEP framework of BPG from convex to nonconvex objective function class and obtained its bound.
- Improved the worst-case performance bound of one Bregman gradient (BG) step with smooth strongly convex kernel.
- Attempted to conduct an iff condition for relatively smooth strongly convex interpolation for unrelaxed Bregman PEP.

Decentralized Federated Minimax Optimization | Zhejiang University

Apr. 2021 – Jun. 2021

Research Intern

Hangzhou, Zhejiang

Advisor: Prof. Hui Qian | College of Computer Science and Technology, Zhejiang University

- Studied the stochastic gradient descent ascent (SGDA) algorithm and its application in saddle-point problem.
- Analyzed the upper convergence bound of SGDA in decentralized federated learning in fixed topology setting.
- Attempted to analyze the convergence of SGDA in decentralized federated learning with varying network topology.

Projects & Programs

Young People's Attitude towards Society | Zhejiang University

Jul. 2020 – Aug. 2020

Researcher of NLP Group

Hangzhou, Zhejiang

Leader: Prof. Lijun Chen | School of Public Affairs, Zhejiang University

- Developed a deep learning model based on BERT to decide positiveness of comments from young testers' social media.

Machine Learning & Artificial Intelligence Short Course | MIT

Aug. 2019

Program Participant, Group Project Leader

Cambridge, Massachusetts

Leading Professors: Dimitri Bertsekas, Devavrat Shah, Vivienne Sze | Department of EECS, MIT

- Accomplished 46 hours course work and a group project about deep reinforcement learning. Scored 96.5/100.

Skills

Programming & Tools: C, C++, Python, Java, MATLAB, Mathematica, SQL, LaTeX, Verilog HDL