

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

- Member of Chu Kochen (CKC) Honors College (700 selected from 6,400)
- Member of Computer Science class of Qiushi Science Program (20 selected from 290)
- Minor in Mathematics and Applied Mathematics
- Overall 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) 2019, 2020
- Zhejiang University Scholarship for Elite Students in Basic Disciplines 2019

Research Experience

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

- Studied the performance estimation problem (PEP) in semidefinite programming form associated with Bregman proximal gradient (BPG) and Bregman proximal point (BPP) methods for convex composite optimization problem.
- Provided alternative proofs for convergence rates of BPG and BPP methods incorporating relative smoothness and relatively strong convexity conditions.
- Extended the PEP of BPG from convex to nonconvex composite optimization with the nonsmooth term convex, obtained a novel bound with no step size parameter compared with existed analyses, allowing maximally $1/L$ step size, in which case the previous bound would blow up to infinity.
- Improved the analytical worst-case performance bound of one Bregman gradient (BG) step with smooth strongly convex kernel and observed promising improvement on constant for BPG numerically.
- 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.

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.

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 subjects' social media.
- The algorithm achieved over 90% accuracy and saved weeks of manual classification work.

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

Language: TOEFL 106(=30R+29L+20S+27W), GRE 329(=159V+170Q+3.5AW)