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 430)
- 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
- 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

- Solved the performance estimation problem (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.
- Improved the worst-case performance bound of one Bregman gradient (BG) step with smooth strongly convex kernel.
- Extended the PEP of BPG from convex to nonconvex objective function class and obtained its bound.
- Attempted to extend the PEP framework to allow performance analysis of adaptive methods.

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 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)