Qinzi Zhang

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Education

Boston College – Morrissey College of Arts and Sciences
B.S. in Mathematics
Minor in Computer Science

- Mathematics GPA: **3.8** / 4.0; Computer Science GPA: **4.0** / 4.0; Cumulative GPA: **3.75** / 4.0
- Mathematics Courses: Real Analysis (*grad level*), Complex Analysis (*grad level*), Applied Analysis, Algebra, Linear Algebra, Probability, Stochastic Processes, Dynamical Systems, Combinatorics, Differential Equations
- Computer Science Courses: Machine Learning, Data Science, Algorithms, Data Structure

Publications

- A. Du, Y. Shen, **Q. Zhang**, and L. Tseng. CRACAU: Byzantine Machine Learning Meets Edge Computing. Under submission of 35th IEEE International Parallel & Distributed Processing Symposium, *IPDPS* 2021.
  (First three authors have equal contribution.)
- **Q. Zhang** and L. Tseng. Echo-CGC: A Communication-Efficient Byzantine-tolerant Distributed Machine Learning Algorithm in Single-Hop Radio Network. In 24th International Conference on Principles of Distributed Systems, *OPODIS* 2020.
- L. Tseng, **Q. Zhang**, and Y. Zhang. Brief Announcement: Reaching Approximate Consensus when Everyone may Crash. In 34th International Symposium on Distributed Computing, *DISC* 2020.
  (Authors are ordered alphabetically.)
- L. Tseng, **Q. Zhang**, S. Kumar, and Y. Zhang. Exact Consensus under Global Asymmetric Byzantine Links. In 40th IEEE International Conference on Distributed Computing Systems, *ICDCS* 2020.
  (First two authors have equal contribution.)

Awards (Boston College)

- Undergrad Research Fellowship — Summer 2020
- Sophomore Scholar — 2019
- Dean's List First Honors — Spring 2019, Fall 2019, Spring 2020

Research Experiences

Byzantine Machine Learning Meets Edge Computing *Sep 2020 – Nov 2020*

- Studied the fault-tolerant distributed machine learning under an edge computing model in which there are several edge servers acting as the intermediate layer between the central cloud server and the edge devices (workers).
- Proposed the *first* Byzantine tolerant SGD algorithm under *edge computing model* and proved its theoretical convergence under a certain condition; simulated its performance with MNIST and CIFAR-10 datasets.

Improving Communication Efficiency of Byzantine Machine Leaning *Jun 2020 – Sep 2020*

- Studied the communication efficiency of Byzantine-tolerant algorithms under distributed machine learning model in which a central server collects gradients from workers and performs SGD with potentially faulty gradients.
- Proposed a communication efficient algorithm, Echo-CGC, that allows some workers to send reduced gradients of size $O(n)$ compared to the raw gradients of size $O(d)$, where d is the dimension of data and n is number of workers, and typically $d \gg n$ in practice.
- Proved the convergence of Echo-CGC with real analysis and probability theory tools.
- Analyzed the performance of the algorithm; Echo-CGC reduces the communication costs by up to 75% under certain assumptions.

Reaching Consensus when Every Node may Crash *Feb 2020 – May 2020*

- Studied Byzantine link failures under a weak communication channel, the fair lossy channel, in which messages can fail to be received infinitely many times.
- Proposed an asynchronous algorithm under fair lossy channel which tolerates both crash failures and Byzantine failures; proved the correctness of the algorithm.

Exact Consensus under Global Asymmetric Byzantine Links *Nov 2019 – Jan 2020*

- Studied Byzantine link failures in a directed complete network under both synchronous and asynchronous models with both static and dynamical adversarial attacks.
- Proposed Byzantine-tolerant algorithms under all the models; proved the correctness for each algorithm.
- Proved strict bounds of reaching consensus under synchronous and asynchronous models with static adversary.