YUYANG QIU | CV

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EDUCATION

Rutgers University *Sep. 2020 – Spring 2025 (expected)*
Major: Industrial and Systems Engineering
Intended Degree: Ph.D.
Advisor: Prof. Farzad Yousefian

Northeastern University (Boston) *Sep. 2018 – Jun. 2020*
Major: Applied Mathematics
Degree: Master of Science

Jiangsu University *Sep. 2014 – Jun. 2018*
Major: Mathematics and Applied Mathematics
Degree: Bachelor of Science

EMPLOYMENT HISTORY

Givens Associates (Intern) Summer 2024
Mathematics and Computer Science Division, Argonne National Laboratory
- Under supervision of Dr. Charikleia Iakovidou. Currently working on memory and communication-efficient asynchronous Federated Learning.

Graduate Research Assistant Fall 2022 - present
Dept. of Industrial and Systems Engineering, Rutgers University
- Under supervision of Prof. Farzad Yousefian. Working on a DOE funded project on "Randomized Federated Learning for Nonsmooth, Nonconvex and Hierarchical Optimization".

RESEARCH

Research Interest

- Designing and mathematically analysing computational algorithms to address optimization problems in federated/distributed learning.
- Applications in machine learning (e.g. training neural networks, hyperparameter tuning, GANs)

Research Area

- Federated Learning
- Distributed/Stochastic Optimization
- Nonsmooth Optimization
- Hierarchical Optimization

PUBLICATIONS

Conference Proceedings

1. Zeroth-Order Methods for Nondifferentiable, Nonconvex, and Hierarchical Federated Optimization
Yuyang Qiu, Uday V. Shanbhag, Farzad Yousefian
Thirty-seventh Conference on Neural Information Processing Systems (NeurIPS 2023)
Paper: https://arxiv.org/abs/2309.13024
Poster: https://nips.cc/media/PosterPDFs/NeurIPS%202023/72874.png?t=1699387657.060764

Journal Articles

0. Zeroth-Order Federated Methods for Stochastic MPECs and Nondifferentiable Nonconvex Hierarchical Optimization
   Yuyang Qiu, Uday V. Shanbhag, Farzad Yousefian
   The manuscript has been submitted to the Mathematics of Operations Research journal.
1. The shock peakon wave solutions of the general Degasperis-Procesi equation (2019)
   Lijuan Qian, Raghda Attia, ***Yuyang Qiu***, Dianchen Lu, Mostafa Khater
   International Journal of Modern Physics B, 33. 1950351. 10.1142/S021797921950351X
2. On Breather and Cuspon waves solutions for the generalized higher-order nonlinear Schrodinger equation with light-wave promulgation in an optical fiber (2019)
   Mostafa Khater, Dianchen Lu, Raghda Attia, Li Juan, ***Yuyang Qiu***
   Comp. Meth. Sci. Eng, 1, pp.101-110.
3. Study on the solitary wave solutions of the ionic currents on microtubules equation by using the modified Khater method (2019)
   Jing Li, ***Yuyang Qiu***, Dianchen Lu, Raghda Attia, Mostafa Khater
   Thermal Science, 23. 370-370. 10.2298/TSCI190722370L

PUBLIC PRESENTATION/CONFERENCE ATTENDED

NeurIPS 2023 Dec. 2023
Poster Session 1

- Poster presentation: Zeroth-Order Methods for Nondifferentiable, Nonconvex, and Hierarchical Federated Optimization
- Poster link: https://nips.cc/media/PosterPDFs/NeurIPS%202023/72874.png?t=1699387657.060764

INFORMS 2023 Annual Meeting Oct. 2023
Session: On Hierarchical and Federated Optimization

- Presentation title: Randomized Zeroth-Order Federated Methods for Nonsmooth Nonconvex and Hierarchical Optimization

SIAM Conference on Optimization (OP23) Jun. 2023
Session: On Addressing Nonsmoothness, Hierarchy, and Uncertainty in Optimization and Games

- Presentation title: Randomized Methods for Nonsmooth and Nonconvex Federated Optimization
- Abstract: https://meetings.siam.org/sess/dsp_talk.cfm?p=128796

UNDERGRADUATE ADVISING

Anuraag Sarkar (*Freshman, Mathematics & Computer Science Major at Rutgers*) Summer 2023
Project: Numerical Validation of Randomized Zeroth-Order Methods for Nonsmooth Federated Learning

- Taught the student the basics of optimization theory and algorithms, such as convexity and gradient-based methods. Also taught the student how to code algorithms in Python
- Introduced the idea of zeroth-order methods and federated learning to the student, helped student code federated algorithms such as Federated Averaging and zeroth-order Federated method
- Student successfully completed the project and made a poster presentation at the 2023 Summer Research Symposium.
  Poster link: https://drive.google.com/file/d/1CX5jonsM-7VR2j9SVDN2bfzxGv0CWGvd/view

SERVICE

Reviewer
Journal

- Institute of Industrial and Systems Engineers (IISE) Transactions

ACADEMIC EXPERIENCE

Distributed and Stochastic Optimization Apr. 2023 – May 2023
Type: PhD-level Course Project *Advisor: Prof. Farzad Yousefian*

- Studied a paper about proximal algorithm in federated learning
- Learned about the principle of proximal algorithms and its benefits
- Implemented the algorithm in python, compared with other algorithms to study its convergence behavior
- Wrote project report and made presentation to the class

Nonlinear Optimization Apr. 2022 – May 2022
Type: PhD-level Course Project *Advisor: Prof. David Coit*

- Purpose is to find out if FBA service by Amazon is worth for a third-party seller to use
- Used Barrier Function Method to solve the nonlinear problem
- Changed problem parameters and found its effect on the convergency
- Wrote project report and made presentation to the class

Simulation Nov. 2021 – Dec. 2021
Type: PhD-level Course Project *Advisor: Prof. Mariya Naumova*

- Assessment of the impact of sampling errors on mean-variance portfolios
- Used traditional mean-variance analysis then discuss portfolio optimization based on OLS and assessment of the impact of sampling errors on mean-variance portfolios

Optimization in Machine Learning and Data Analysis Apr. 2021 – May 2021
Graduate-level Course Project *Advisor: Prof. Yuqian Zhang*

- Conduct a survey of optimization in data analysis and machine learning
- Studied classic problems such as least squares, support vector machines and logistic regression
- Applied convex optimization methods to solve classic problems, studied the benefit and limit of traditional methods
- Studied the role of modern optimization in deep learning, and the challenge in it (such as nonsmoothness and nonconvexity)

Data Analysis Nov. 2020 – Dec. 2020
Type: Graduate-level Course Project *Advisor: Prof. Grace Guo*

- The objective was to identify which parts, subcomponents and main components are more likely to cause a car accident in each season and the most frequent pattern when mixed with accidents/breakdowns and seasons based on real datasets
- Used the R language to analyze datasets and made illustration graphs
- Made a PowerPoint and a video for presentation

Differential Equations Related May 2019 – Sep. 2019
Type: University Level *Advisor: Prof. Dianchen Lu*

- Served as a research assistant to Prof. Lu
- Wrote and submitted a paper entitled "On Breather and Cuspon waves solutions for the generalized higher-order nonlinear Schrodinger equation with light-wave promulgation in an optical fiber"
- Wrote and submitted a paper entitled "Study on the solitary wave solutions of the ionic currents on microtubules equation by using the modified khater method"
- Wrote and submitted a paper entitled "The Shock Peakon Wave Solutions of the General Degasperis Procesi Equation"

Combinatorial Optimization Mar. 2019- Apr. 2019
Type: Graduate-level Curriculum Design *Advisor: Prof. Oana Veliche*

- Conducted a brief research on Cook's Theorem and explained it in my own words
- Consulted related literature and wrote an essay

Research on sweeping robot algorithm Dec. 2017 – Jun. 2018
Type: Undergraduate Final Year Design *Advisor: Prof. Zhidan Deng*

- Wrote a paper entitled in "Research on sweeping robot algorithm"

INTERNSHIP

Yi Jia He Technology Co., Ltd Jun. 2018 –Aug. 2018
Intern in the department of software development *Nanjing, China*

- Learned how the power transformer substation inspection robot works
- Learned to use robot recognition and image processing skills

NARI Group Corporation/State Grid Electric Power Research Institute Dec. 2017 –Feb. 2018
Intern in the department of software development *Nanjing, China*

- Learned the working principle and working method of substation inspection robot

EXTRACURRICULAR ACTIVITIES

INFORMS Rutgers Student Chapter Sep. 2022- present
Serving as Treasurer of the chapter *Chapter Advisor: Prof. Ahmed Aziz Ezzat*

- Organized and participated in a pizza gathering for the graduate students in the ISE department
- Organized and participated in an online Zoom event aimed to boost LinkedIn page
- Offered course advices for first-year graduate students

College Student Union Public Relations Department Sep. 2014- Jun. 2015

- Participated in planning and negotiated with sponsors

TECHNICAL STRENGTH

Python

- Familiar with Python libraries and tools
- Good at implementing new algorithms that are not built-in, use coding as a way to understand the idea of algorithms

Matlab & R

- Familiar with toolboxes, data analysis