

YUYANG QIU | CV

◇ Website: <https://yuyangqiu2023.github.io/YuyangQiu/>

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EDUCATION

Rutgers University

Fall 2020 – Spring 2025 (expected)

Major: Industrial and Systems Engineering

Intended Degree: Ph.D.

Advisor: Dr. Farzad Yousefian

Northeastern University (Boston)

Sep. 2018 – Aug. 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 (Hara) Iakovidou. Worked 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 Dr. Farzad Yousefian. Working on two DOE funded projects: (1) Randomized Federated Learning for Nonsmooth, Nonconvex, and Hierarchical Optimization; (2) Privacy-Preserving Federated Learning for Science: Building Sustainable and Trustworthy Foundation Models.

RESEARCH

Research Interests

- Distributed/Federated Optimization
- Stochastic Optimization
- Foundation Models
- Nonsmooth and Hierarchical Optimization
- Nonconvex/Convex Optimization
- Mathematical Programs with Equilibrium Constraints

Research Applications

- Training neural networks, hyperparameter tuning, and Stackelberg games.

PUBLICATIONS

Conference Proceedings

1. Yuyang Qiu, Uday V. Shanbhag, Farzad Yousefian. *Zeroth-order methods for nondifferentiable, nonconvex, and hierarchical federated optimization*. Thirty-seventh Conference on Neural Information Processing Systems (NeurIPS 2023).

Paper: <https://arxiv.org/abs/2309.13024v2>

Poster: <https://nips.cc/media/PosterPDFs/NeurIPS%202023/72874.png?t=1699387657.060764>

Video presentation (5 mins): <https://neurips.cc/virtual/2023/poster/72874>

Journal Articles

- 0.1 Yuyang Qiu, Farzad Yousefian, Brian Zhang. *Iteratively regularized gradient tracking methods for optimal equilibrium seeking*. **IEEE Transactions on Automatic Control** (submitted, under review). arXiv preprint: <https://arxiv.org/abs/2411.18883>
- 0.2 Yuyang Qiu, Uday V. Shanbhag, Farzad Yousefian. *Zeroth-order federated methods for stochastic MPECs and nondifferentiable nonconvex hierarchical optimization*. **Mathematics of Operations Research** (under first revision). arXiv preprint: <https://arxiv.org/abs/2309.13024>
1. Lijuan Qian, Raghda Attia, Yuyang Qiu, Dianchen Lu, Mostafa Khater. *The shock peakon wave solutions of the general Degasperis-Procesi equation*. **International Journal of Modern Physics B**, 33. 1950351, 2019. doi: 10.1142/S021797921950351X.
2. Mostafa Khater, Dianchen Lu, Raghda Attia, Li Juan, Yuyang Qiu. *On Breather and Cuspon waves solutions for the generalized higher-order nonlinear Schrodinger equation with light-wave promulgation in an optical fiber*. **Numerical and Computational Methods in Sciences & Engineering**, 1, pp.101-110, 2019. doi: 10.18576/ncmse/010205.
3. Jing Li, Yuyang Qiu, Dianchen Lu, Raghda Attia, Mostafa Khater. *Study on the solitary wave solutions of the ionic currents on microtubules equation by using the modified Khater method*. **Thermal Science**, 23. 370-370, 2019. doi: 10.2298/TSCI190722370L.

Manuscripts in Preparation

1. Mohammadjavad Ebrahimi, Yuyang Qiu, Farzad Yousefian. *Federated simple bilevel optimization: a universal regularized scheme with guarantees*. **Mathematical Programming Computation** (currently revising the first draft).

PRESENTATIONS

2024 INFORMS Annual Meeting Oct. 2024
Session: Federated Learning and Optimization: I

- Presentation title: Zeroth-Order Federated Methods for Stochastic MPECs and Nondifferentiable Nonconvex Hierarchical Optimization

25th International Symposium on Mathematical Programming (ISMP 2024) Jul. 2024
Session: Nonconvexity, Stochasticity and Hierarchy in Optimization Problems

- Presentation: Zeroth-Order Federated Methods for Stochastic MPECs and Nondifferentiable Nonconvex Hierarchical Optimization

37th Annual Conference on Neural Information Processing Systems (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>

2023 INFORMS 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

- In collaboration with Aresty Research Center
- 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 its zeroth-order variant
- 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>

Krishaan Chaudhary (*Junior, Mathematics & Computer Science Major at Rutgers*)

Fall 2024 - present

Research topic (tentative): Federated Learning Under Heterogeneous Settings

- In collaboration with Aresty Research Center
- Currently at early stage of the research topic

SERVICE

Reviewer

- Science China Information Sciences (5 year IF: 5.8)
- Institute of Industrial and Systems Engineers (IISE) Transactions Journal (5 year IF: 2.8)

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 Research Panel for undergraduate and graduate students
- Organized and participated in weekly Q & A sessions with the department seminar speakers
- Organized and participated in a social gathering for the graduate students in the ISE department
- Organized and participated in an online Zoom event aimed to boost LinkedIn page
- Offered advices on coursework to first-year graduate students Chapter LinkedIn:

College Student Union Public Relations Department

Sep. 2014- Jun. 2015

- Participated in planning and negotiated with sponsors

TECHNICAL STRENGTH

Optimization Solvers

- Gurobi
- CVX, CVXPY

Python

- Familiar with Python libraries such as NumPy, Pandas, Scikit-learn, TensorFlow and PyTorch
- Good at implementing new algorithms that are not built-in with Jupyter Notebook, use coding as a way to understand the idea of algorithms

Matlab & R

- Familiar with toolboxes, data analysis

PROFESSIONAL AFFILIATIONS

- Institute for Operations Research and the Management Sciences (INFORMS)
- Society for Industrial and Applied Mathematics (SIAM)
- Mathematical Optimization Society (MOS)
- Institute of Electrical and Electronics Engineers (IEEE)