Hoai-An Nguyen

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RESEARCH INTERESTS

My primary research interests are in algorithmic design and analysis and complexity theory. Specific topics include sublinear time algorithms, streaming algorithms, randomized algorithms, approximation algorithms, and establishing asymptotically optimal lower bounds. More broadly, I am also interested in machine learning theory and algorithmic game theory.

EDUCATION

- **Rutgers University, New Brunswick** Expected Degree: May 2023
  B.S. in Computer Science, B.A. in Economics
  - Thesis: *Asymptotically Optimal Bounds for Estimating H-Index in Sublinear Time with Applications to Subgraph Counting*
  - Advisor: Sepehr Assadi
  - GPA: 4.00/4.00

HONORS AND AWARDS

- Nicholas V. Novielli Memorial Endowed Scholarship, Rutgers CS Department, 2023
- Rizvi Research Award, Rutgers CS Department, 2022
- Edward L. Shustak Memorial Scholarship, Rutgers Economics Department, 2022
- Presidential Scholarship, Rutgers University, 2019 – 2023
- Honors College Designation, Rutgers University, 2019 – 2023
- National Merit Finalist Scholarship, Rutgers University, 2019 – 2023

PUBLICATIONS

- *Asymptotically Optimal Bounds for Estimating H-Index in Sublinear Time with Applications to Subgraph Counting*
  S. Assadi, H. Nguyen
  International Conference on Approximation Algorithms for Combinatorial Optimization Problems, **APPROX 2022**
  Presentation | Conference Version | Full Version

- *Provable Reset-free Reinforcement Learning by No-Regret Reduction*
  H. Nguyen, C. Cheng
  International Conference on Machine Learning, **ICML 2023**
  Also spotlighted at **AAAI RL4PROD 2023 Workshop**
  Full Version

RESEARCH EXPERIENCE

- **Rutgers University, Department of Computer Science** Sept 2021 – Present
  Algorithms Undergraduate Researcher
  - Working under the direction of Professor Sepehr Assadi
  - Exploring sublinear algorithms, streaming algorithms, and lower bounds on the query complexity of algorithms
  - Designed a sublinear time algorithm to compute a user's *h*-index and established a lower bound that is asymptotically optimal in all parameters
  - Created a general technique to obtain asymptotically optimal lower bounds for sublinear time algorithms

- Collaborating with Postdoctoral Researcher Zihan Tan to design a streaming algorithm for the travelling salesman problem

◊ **Microsoft Research, Reinforcement Learning Group** Summer 2022
Research Intern
- Interned under Ching-An Cheng
- Carried out extensive literature review for reset-free reinforcement learning (RL), safe RL, and constrained MDPs
- Real-world RL commonly requires human intervention to reset the environment when the agent permanently alters it or puts itself in danger
- Reset-free RL aims to find reward maximizing policies that also avoid/minimize resets to make real-world RL more practical
- Created a generic no-regret reduction to systematically design reset-free RL algorithms
- Designed the first provably correct reset-free RL algorithm

INDUSTRY EXPERIENCE

◊ **Facebook** Summer 2021
Software Engineering Intern
- Created infrastructure to compare static and dynamic ads to detect problems and facilitate migration to the dynamic ad model
- Identified and collected data on broken fields and features within multi-ad ad sets
- Collaborated with the representation fix team to resolve identified issues
- Tools used: C++, Python, Pandas, Mercurial

◊ **Bank of America** Summer 2020
Technology Analyst Intern
- Combined deep learning and image processing to explore facial recognition on live video streams
- Utilized machine learning and regression models to forecast ATM cash withdrawals
- Tools used: Python, OpenCV, Pandas, Torch, Sklearn, DLIB

TEACHING EXPERIENCE

◊ **Rutgers University, Department of Computer Science** Sept 2020 – Present
Learning Assistant
- Courses: Data Structures, Introduction to Computer Science
- Lead recitations to facilitate active and collaborative learning

Head Learning Assistant Jan 2021 – May 2022
- Assisted in the coordination of the Data Structures course
- Managed ~30 other learning assistants and created recitation problems
- Helped review and revise course assignments and exams

◊ **Rutgers University, Department of Computer Science** Jan 2022 – May 2023
Teaching Assistant
- Course: Design and Analysis of Computer Algorithms (Spring 2022 & 2023)
- Ran recitations and office hours to assist students
- Wrote problems for course assignments and exams

◊ **Other**

Private Tutor Sept 2019 – May 2021
- Tutored college students in Physics, Calculus, and Computer Science

Teaching Assistant Sept 2017 – May 2019

- Worked at a Kumon Learning Center
- Assisted K-12 students in math and English

LEADERSHIP

◊ **Rutgers Undergraduate Student Alliance of Computer Scientists**

Mentor Sept 2020 – Present

- Advise a small pod of CS students to help them navigate the major and recruiting

Outreach Director May 2020 – May 2021

- Organized speaker and company events centered around CS research and software engineering
- Facilitated student interaction with CS faculty, graduate students, and alumni
- Collaborated with the Women in Computer Science club to promote diversity

Education Chair Jan 2020 – May 2020

- Helped organize hacker hours which brought industry speakers to lead participants through a short project