Rashmika Goswami

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Objective: Mathematician with a background in probability, randomized algorithms, and graph theory seeking a research scientist position in which to apply skills in problem solving and algorithm development to real-world problems of import.

Experience

Metron *May 2022 - August 2022*

- Research Intern: Researched methods for multiple object tracking utilizing Bayesian inference and analytic combinatorics.
- Implemented particle filters in Mathematica to test these methods on simulated data and leveraged salient patterns in the data to prove guarantees on the efficacy of these algorithms. Prepared report summarizing results.

Rutgers University *August 2018 - Present*

- Lecturer: Created lectures and assessments, and delivered over 50 hours of instruction each semester for a precalculus course of 80 non-STEM majors.
- Research Assistant: Conducted research, individually and collaboratively, on graph algorithms, complexity of Boolean functions, and resource allocation problems, using Maple and Python to test conjectures and generate relevant examples.
- Instructor for Rutgers Young Scholars Program: Designed and taught a one-week, inquiry-based introductory graph theory course for advanced high school students for 3 summers.
- Teaching Assistant: Graded, held office hours, and taught recitations and/or exam reviews for Calculus I and Statistics.

Biomedical and Clinical Informatics Lab, University of Michigan *September 2014 - February 2016*

- Undergraduate Researcher: Developed and tested algorithms for the detection of stenosis in coronary angiograms and implemented method for the removal of obstructive artifacts from angiogram images.

Skills and Certifications

Programming Languages

- Python (numpy, scipy, scikit-learn, sympy, pandas, matplotlib), C++, Matlab (image processing toolbox), Maple, Mathematica, LaTeX (Tikz), basics of Java, HTML/CSS, SQL, Git.

Erdös Institute: Data Science Bootcamp *May 2021*

- Applied coursework in machine learning techniques including PCA and tested various methods of text extraction and cleaning in a group project to extract data and detect trends in World Bank loan documents. Certificate: here.

Selected Projects and Publications

Randomized Greedy Algorithm for Online Edge Coloring *July 2022 - Present*

- Developed a framework for analyzing a stochastic process on networks in order to address a 30-year old question regarding the viability of an online optimization algorithm. (Presented at SODA 2025, preprint: here.)

The Sortability of Graphs and Matrices under Context Directed Swaps *May 2017 - July 2017*

- Classified all graphs and matrices sortable under an operation modeling a ciliate gene decryption process for a 4-person team project. Presented at Joint Math Meetings (JMM 2018) and won Outstanding Poster. (Preprint: here.)

Leadership

Instructor at South Street Salsa *January 2025 - Present*

Rutgers Directed Reading Program *January 2020 - May 2024*

- Organized pairings between undergraduate and graduate students with similar mathematical interests as lead coordinator for the directed reading program for 2 years, and mentored 3 students in independent reading courses.

Treasurer of Rutgers AMS Graduate Chapter *November 2020 - June 2023*

Seminar Co-Organizer *August 2019 - May 2022*

- Scheduled speakers and coordinated meetings for 2 seminars. Gave 14+ presentations across 5 reading groups/seminars.

Education

Rutgers University: Mathematics PhD, GPA: 4.0 *2018 - 2024*

- Research interests: Design and Analysis of Algorithms, Computational Social Choice, Boolean Function Complexity
- Academic Excellence Award (Spring 2019)

University of Michigan - Ann Arbor: Computer Science BSE and Math Minor, GPA: 4.0 *2014-2018*

- Course Highlights: Autonomous Robotics, Machine Learning, Computer Vision, Algorithms, Cryptography