Grace Li

Los Angeles, CA • graceli@math.ucla.edu • www.math.ucla.edu/~graceli
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Education

University of California, Los Angeles (UCLA) Expected Graduation: Jun 2024
Ph.D. in Mathematics (Applied)
M.A. in Mathematics (Applied), Awarded: Dec 2021, GPA: 4.0/4.0

The Cooper Union for the Advancement of Science and Art, New York, NY Graduated: 2017
B.E. in Chemical Engineering with Mathematics Minor

Technical Skills

Python, Pytorch, C++, MATLAB, LaTeX

Work Experience

Graduate Student Researcher
UCLA, Advisor: Mason Porter 2020 – Present

- Developed bounded-confidence models (BCMs) of opinion dynamics that use node weights to represent heterogeneous activation probabilities to capture the varied frequencies of social interaction in social networks
- Generalized BCMs to incorporate adaptive confidence bounds that represent agents changing their willingness to listen to each other based on past interactions and observed novel consensus behaviors
- Formulating and studying BCMs with higher-dimensional opinions that are interdependent during interactions
- Characterizing qualitative behaviors of my models including consensus and opinion fragmentation and the structure of the effective receptivity graph

Computing Scholars Intern
Lawrence Livermore National Laboratory (LLNL), Livermore, CA Summer 2023

- Designed and implemented methods for soft community detection of large networks based on personalized page rank applied to multiple seed nodes by combining ideas from existing literature and adapting them to a distributed setting using a C++ asynchronous communication library for distributed computing
- Evaluating the effects of seed-node selection on the communities and investigating the characteristics of the soft-community profiles found by our method by continuing the collaboration with LLNL

Data Science Summer Institute (DSSI) Intern
Lawrence Livermore National Laboratory (LLNL), Livermore, CA Summer 2022

- Constructed, cleaned, and conducted exploratory data analysis on a big data set (∼8.2 billion posts) of Reddit discussion trees from 2006 to 2020 using a C++ asynchronous communication library for distributed computing
- Examined how the structures of discussion trees on Reddit change over time and the effect of subreddit and early users on the structural virality and size of the discussion trees
- Built machine-learning models using Pytorch, focusing on graph neural networks (GNNs), with a team of interns for the DSSI challenge problem to predict whether a ligand binds to and inhibits the virus that causes COVID-19

High Energy Density Physics (HEDP) Intern
Lawrence Livermore National Laboratory (LLNL), Livermore, CA Summer 2021

- Assessed how geometry and scaling of material grains, modeled as density perturbations, affect shock propagation with applications in inertial confinement fusion
- Wrote a Python code package which utilized asymptotic analysis and Fourier analysis to make analytic predictions for the behavior of the linearized governing partial differential equations

Research and Development Chemical Engineer
Chemtool Incorporated, Rockton, IL 2017 – 2019

- Developed new grease products tailored to meet customer application needs and performance targets
- Designed and carried out experiments by pinpointing relevant parameters and data collection needs for research and improvement of grease technologies
- Collaborated with an interdepartmental team to find $2M in cost savings by identifying, evaluating and implementing changes to raw materials, formulations and production procedures

Selected Additional Projects

Twitter Response of Fortune-100 Companies to Racial Justice

UCLA, Applied Math Seminar Spring 2021

- Utilized non-negative matrix factorization for topic analysis of Fortune-100 tweets from summer 2020
- Determined the shift and focus of the Twitter conversation over time for topics such as racial justice, COVID-19, CEO statements, and celebrations by using dynamic topic models
- Conducted exploratory data analysis on Fortune-100 Twitter profiles and activity to identify key companies in the Twitter conversation during this time period under various metrics

Node Classification with Graph Neural Networks (GNNs)

UCLA, Machine Learning Algorithms Course Winter 2021

- Used GNNs to classify the subject areas of papers in a citation network of computer science papers on arXiv
- Implemented and explored using various GNN architectures, including graph convolutional networks and graph attentional networks, from literature sources, and tuned their hyperparameters to increase accuracy

Congressional Voting Analysis

UCLA, Applied Math Seminar Fall 2020

- Analyzed data from United States congressional roll-call votes using community-discovery methods for networks to classify political-party affiliation and study political polarization over time

Outreach and Teaching

Women in Math (WIM) Organizer 2020 – Present

- Fostering community and providing support for women in the department by organizing social events, inviting speakers, and hosting panels about graduate school or working in industry
- Mentored 7 undergraduate students in the WIM mentorship program and assisted them in their career paths by offering advice, discussing experiences, and providing feedback on application materials

Undergraduate Project Mentor Sep 2022 – Jun 2023

- Co-mentored an undergraduate student with Mason Porter to examine agent-based models for pedestrian evacuation that incorporate changes in pedestrian behaviors that depend on the local densities of the nearby crowd
- Simulated evacuation of pedestrians from the UCLA mathematics building with various initial conditions

Teaching Assistant Jan 2022 – Dec 2022

- Taught a discussion section of 35–40 students once a week for the Introduction to Networks course, which covers random-graph models, random walks, centrality measures, community detection, and other network analysis tools
- Graded weekly homework sets, which included proofs and programming problems, and graded part of the exams
- Helped students at least 2 hours/week in office hours and via emails by answering homework questions, debugging Python code, and giving feedback and ideas on final projects

Equity, Diversity & Inclusion (EDI) Committee Graduate Representative Sep 2021 – Jun 2022

- Worked with another graduate student to voice concerns and ideas and bring a graduate student perspective to the EDI committee meeting every other week
- Helped drive standardization and transparency of the qualifying exam requirements (updated topic lists and passing score requirements) by surveying graduate students, presenting anonymized feedback to the EDI committee, and urging professors to adopt changes

Papers

G. Li and M. A. Porter. "Bounded-Confidence Model of Opinion Dynamics with Heterogeneous Node-Activity Levels." *Physical Review Research*, Vol. 5, No. 2: 023179, 2023.

G. Li*, J. Luo* and M. A. Porter (*joint first author). "Bounded-Confidence Models of Opinion Dynamics with Adaptive Confidence Bounds." Preprint arXiv:2303.07563. March 2023.

Selected Scholarship

UCLA Dissertation Year Fellowship 2023 – 2024

NSF Research Trainee (MENTOR Program) 2019 – 2021

Cooper Union Full Tuition Scholarship 2013 – 2017