

Paul Yushin Rapoport

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in paul-rapoport-266ba2291 • 🌐 Lorxus

Summary and Portfolio

- Quantitative researcher and mathematics PhD. Skilled at choosing the right abstractions to understand and solve practical problems. At home using advanced statistical and analytical techniques. Expertise in Python scientific computing, mathematical modeling, and data cleaning and visualization. Has worked with large and varied datasets, including economic measures, geographic CSV, and time-series grade datasets. Willing to relocate, including to the US West Coast. Hybrid or on-site work environments preferred.
- Programming Portfolio: <https://github.com/Lorxus/Portfolio/> Varied data science, mathematical modeling, and other coding projects displaying expertise in listed technical skills.

Technical Skills

Primary Development Language: Python

Other Programming Languages: R, Java, MATLAB, Lean

Data Science Toolkit: NumPy, Matplotlib, Looker, scikit-learn, PyTorch

Data Management: SQL, Excel + VBA, Google Sheets, MS Office, Github (version control)

Statistical Techniques: Linear/polynomial regression, Monte Carlo Markov chain sampling, time-series analysis, causal inference and Bayes nets, A/B testing & randomized controlled trials, k-means & GMM clustering

Education

University of Illinois – Chicago

PhD in Mathematics

Concentration in geometric group theory with additional work in category theory and model theory

Chicago

2015–Dec 2021

Princeton

BA in Mathematics

Includes a senior thesis in knot theory and substantial course work in molecular biology

Princeton, NJ

2011–2015

Employment and Experience

Research Grants and Programs

Machine Learning Alignment and Theory Scholars

Scholar – Agent Foundations Track

San Francisco

2024

- Conducted clustering-based analysis on large and varied data-sets including GIS and CSV handling, studied causal inference and Bayes nets, and gained a working familiarity with frontier AI models

Open Philanthropy, Center on Long-term Risk

Independent Researcher Roles

2023–2024

Long-Term Future Scholarship program

- Conducted independent research on generalizations of imprecise probability theory for applicability to AI safety.

Vocational

University of Illinois – Chicago; Temple University

Chicago, Philadelphia

Undergrad Teaching Positions

2015–2020, 2022–2023

Teaching and grading for math department courses, as support for research in geometric group theory

- Taught 30 total classes totaling over 1,000 undergraduates in courses from College Algebra to Calculus III
- Developed and implemented data-driven pedagogical strategies, using time-series grade analysis to improve student outcomes
- Implemented statistical modeling in Excel to identify and support at-risk students, improving classes' pass rates by an average of 8% above department average and attracting 20 students to quantitative disciplines
- Tracked stand-out students identified in the above analysis to math department programs like REUs and the Mathematical Computing Lab

University of Illinois – Chicago

Chicago

Mathematical Computing Lab Fellow

2016–2017

Primarily responsible for UIC's 3D modeling and printing program

- Aided 12 math majors in an undergraduate project with the coding, 3D modeling, and 3D printing necessary for their projects, which they displayed at the recurring Open House events
- Created over 100 3D prints of different mathematical objects to use as props for lectures and student gatherings

KAIST and Princeton

Daejeon, Korea and Princeton, NJ

Research Intern

2012–2015

Summer research in listed topics

- KAIST, 2012 – Econometrics: Used Visual Basic and random matrix theory to conduct econometric analysis of the time-series price data of over 30 commodities
- Princeton, 2013 – Molecular Biology: Transfected E. coli using CRISPR to produce enzymes and measure rate constants for methylation reactions
- Princeton, 2014–2015 – Mathematics: Wrote two expository papers on knot theory as part of my research

Academic Publications and Other Major Work

- “On the profinite distinguishability of hyperbolic Dehn fillings of finite-volume 3-manifolds”, found at <https://msp.org/agt/2024/24-9/p02.xhtml>. Algebraic & Geometric Topology 24-9 (2024), 4779–4797, DOI 10.2140/agt.2024.24.4779 . Significant for using model theory, a branch of logic, as a relatively novel methodology for advancing geometric group theory.