# Gabriel Smithline

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## Personal Profile

I am passionate about exploring the intersection between AI, EconCS, and Complex Systems. I hold United States and Polish citizenship. I also hold a Secret Security Clearance.

Personal Website: `https://gsmithline.github.io`

## Education

**University of Michigan Ann Arbor** — *Ann Arbor, MI*

PhD Student in Computer Science and Engineering — *August 2024 - Expected May 2028*

- **Advisor:** Michael P. Wellman

**Tufts University** — *Medford, MA*

MS in Computer Science — *May 2022 - May 2024*

- **GPA:** 3.97

**Lafayette College** — *Easton, PA*

BA Economics, Data Science, Statistics — *August 2017 - May 2021*

- Data Education and Feminism Scholar at Lafayette and Beyond (DEFLAB)
- 4 year Division 1 Student-Athlete on the men's lacrosse team committing 30 plus hours a week to activities on top of school
- Winner of the 2021 Heard Unsung Hero Award for my contributions to the men's lacrosse program and athletic department at Lafayette
- Men's Lacrosse Academic Athletic Award and Patriot League All Academic Team

**Relevant Courses and Topics Thus Far**

- Probability and Statistics, Analysis of Variance, Data Science, Econometrics, Linear Algebra, Calculus, Discrete Math, Microeconomics, Macroeconomics, Game Theory and Mechanism Design, Computational Simulations of Markets and Behaviors, Machine Learning, Cybersecurity, Data Structures and Algorithms, Analysis of Algorithms, Databases, Software Engineering, AI, Theory of Computation, Reinforcement Learning (Spring 2024), and Probabilistic Systems Analysis (Spring 2024).

## Industry Work Experience

**Tufts University** — *Medford, MA*

Machine Learning Course Assistant — *August 2023 - May 2024*

- Helped run office hours, grade assignments, run recitations, answer questions for students, and generally support them in the machine learning course.
- **Technical Skills:** Python with various statistical packages, Statistics and Probability, Linear Algebra, Calculus, and Machine Learning

**Jefferies** — *New York, New York*

Quantitative Risk Summer Associate — *June 2023 - August 2023*

- Interned for summer 2023 working to model risk for fixed income trading as well as helping to build out the banks e-trading and algorithmic trading business. Specifically I helped to automate VaR and Monte-Carlo VaR simulations as well as help develop software to price certain fixed income securities.
- I also developed internal software to run VaR calculations on full fixed income trading data to help move the bank move away from external vendors. This software will be used by analysts across the firm to help mitigate risk.
- The results of my work helped speed up systematic risk calculations by $50\%$
- **Technical Skills:** Python with various statistical packages, Statistics and Probability, Monte Carlo Simulations, Econometrics, Scripting, Git, Microsoft Azure, AWS, MDX, SQL.

**Capital One** — *Washington, DC*

Software Engineer, Enterprise Data and Machine Learning — *August 2021 - December 2022*

- Scaled and designed API to handle more than 52,000 transactions per second with less than 7 ms response time.
- Enabled canary deployments, identified/remediated bottlenecks in code, built features to track lineage of all data flowing through the API.
- Helped data scientists and ml engineers run models and perform inference in low latency environments.
- Became Certified AWS Solutions Architect.
- Left December 2022 to pursue masters education full time.
- **Technical Skills:** AWS, Python, Scala, Java, Terraform, Git.

## Projects and Research

**Improving Multi-Agent Strategies through Learning and Game Theoretic Graphs** — *Destin, Florida*

Hap Arnold Summer Fellow — *May 2024 - Present*

- Researching Differential Game Theory, Geometric Deep Learning, and Graph Theory.
- I was awarded the Hap Arnold summer fellowship and I am being hosted by Dr. Scott Nivison
- I'm spending my time working in conjunction with the AI Lab and the Dynamical Systems and Control Theory Lab

**Complexity Theory, Algorithmic Game Theory, and Security Research** *Remote*

Tufts University *August 2023 - May 2024*

- Developed models of deception as a defensive strategy against attackers using various optimization techniques, Game Theory, AI, Mechanism Design, and other concepts from Computer Science.
- **Technical Skills:** Python, CVXPY, Numpy, Jax, SK-Learn, Game-Py, and other various python packages

**Algorithms, Law, and Policy Working Group Member** *Remote*

Mechanism Design For Social Good *September 2023 - Present*

- Member of the Algorithms, Law, and Policy group which is working on research, implementation, and advocacy projects.

**Quantitative Research Analyst: AI Index** *Medford, MA*

The Fletcher School *June 2023 - September 2023*

- Helping to do PCA and Unsupervised learning (specifically K-Means and Spectral Clustering) to abstract patterns in AI usage data between countries and regions.
- Created unique and interactive visualizations to explain these patterns in a more immersive and user friendly way.
- This was part of a greater initiative by Fletcher to put out a report on who is winning the AI race.
- **Technical Skills:** R, Python, Matplotlib, Plotly-Dash, Machine Learning, Probability and Statistics.

**Data Education Scholar: Understanding Eviction Rates** *Easton, PA*

Lafayette College *January 2021 - May 2021*

- Developed a model to predict the causes of evictions using different Geospatial, ANOVA Modeling, VIF, Regression Subsets Techniques in R/Python.
- Validated to find the best model using Tukey HSD tests to compare possible combinations and test their variables between their means, all while adjusting the higher p-value threshold to compensate for many statistical tests being run. I found I was statistically able to model eviction rates locally given the features I used to model.
- Taught intro level statistics classes about what I found and created exercises for them in R to teach them the power of data science and programming.
- Built Dashboards in Plotly-Dash and Shiny to present my findings in a more user friendly way.
- **Technical Skills:** R, Python, Matplotlib, Plotly-Dash.

**Capstone Project: Computational Simulations of Markets and Behaviors with Agent Based Modeling** *Easton, PA*

Lafayette College *January 2021 - May 2021*

- Used Netlogo to create Agent Based Models to model complex systems found in everyday life.
- Explored different market structures and analyzed how different distributions of rational agents led to different market outcomes.
- **Technical Skills:** Netlogo