Arjun Shanmugam

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EDUCATION

Brown University Providence, RI | May 2023
B.S. in Computer Science-Economics **GPA:** 3.96/4.00; 4.00 within major. **GRE:** 170/170 Q; 166/170 V; 5/6 W
Relevant Coursework: Advanced Topics in Econometrics, Bayesian Econometrics and Statistics, Big Data, Computational Linguistics (NLP), Computational Probability and Statistics, Deep Learning, Differential Equations, Discrete Mathematics, Linear Algebra, Machine Learning, Mathematical Econometrics, Microeconomics, Multivariable Calculus, Probability, Real Analysis, Software Engineering, Statistical Inference

EXPERIENCE

Opportunity Insights at Harvard University Cambridge, MA | June 2023 – Present
Pre-doctoral Fellow under Professors Raj Chetty, John Friedman, and Nathan Hendren

- Calculated the joint distribution of SAT score and parent income, covered by The New York Times
- Performed statistical analysis of restricted college admissions records and massive tax datasets using Python and SQL for "Diversifying Society's Leaders?" covered by The New York Times
- Built a Python and SQL codebase that processes the universe of raw American tax forms into a 12 billion row database ("The IRS Databank") used by the IRS and Treasury, reducing build time from one month to 3 days
- Transitioned lab's big data and computing infrastructure from SAS to Python and SQL, resulting in huge efficiency gains
- Generated 50+ data visualizations using Matplotlib and Stata to present novel results effectively

Opportunity Insights at Harvard University Cambridge, MA | May 2022 – June 2023
NLP Research Assistant to Professors John Friedman, Amy Handlan, Nathan Hendren

- Examined differences in language used by male vs. female reviewers at the *Journal of Public Economics*
- Engineered NLP pipeline using pandas and Scikit-Learn to extract features from manuscripts and reviewer reports
- Trained and tested cross-validated LASSO machine learning models on document term matrices extracted from text
- Devised an algorithm which separates papers' introductions from the rest of their text with over 70 percent accuracy
- Formulated parametric and nonparametric models of referee report text, each controlling for paper content in different ways
- Parallelized computationally intensive processes such as the estimation of likelihood ratios using joblib

COVID-19 School Data Hub Providence, RI | February 2022 – May 2023
Machine Learning Research Assistant to Emily Oster

- Trained machine learning models using cell phone traffic data to predict schooling mode (virtual, in-person, hybrid)
- Built logit regression models and neural networks using Python, achieving above 75 percent testing accuracy
- Created frameworks in Stata to systematically contextualize prediction accuracy and reported results in whitepaper

LEADERSHIP AND PROJECTS

Eviction and Crime: Quasi-Experimental Evidence from Boston Providence, RI | September 2022 – Present
Author

- Won Outstanding Honors Thesis Award in Economics (best undergraduate economics thesis at Brown)
- Spatially joined every attempted eviction in Boston since 2019 with 1 million crime incidents using computing cluster
- Estimated propensity scores using maximum likelihood estimation to balance treatment and control group on observables
- Estimated staggered, doubly robust difference-in-difference effects of eviction on crime immediately around the property

Brown Opinion Project Providence, RI | September 2021 – May 2023
Director of Research and Polling

- Led polling and research operations for Brown Opinion Project, Brown University's first and only random pollster
- Built boptools, a Python library which recodes, weights, graphs, and crosstabs survey data from thousands of students
- Contracted to run polls on behalf of the Brown Daily Herald, Brown University's daily newspaper

Brown Department of Economics Providence, RI | January 2022 – May 2023
Teaching Assistant, Mathematical Econometrics, Professor Jonathan Roth

- Taught statistical theory to two sections of 30 students each, earning top reviews (mean 4.8/5, median 5/5)
- Received strong feedback: *"Arjun is single handedly the most fantastic TA I have had while at Brown. His deep understanding of all topics as well as his willingness and availability to explain difficult concepts made him more than just a TA! I wish I had an Arjun in all of my classes as a TA."*

SKILLS

Technical Skills: SciPy stack (NumPy, pandas, Scikit-Learn, statsmodels), High-performance computing and too-large-for-memory datasets (Dask, Dask-Jobqueue, SQL), NLTK, TensorFlow, Stata