

NATHANAEL JO

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Research Interests	Algorithmic Auditing, Alignment, and Bias; Human-AI Interaction; Machine Learning	
Academics	Massachusetts Institute of Technology , Cambridge, MA PhD Computer Science <i>Research Advisors</i> : Manish Raghavan and Ashia Wilson	2023 – Present
	University of Southern California , Los Angeles, CA M.S. Applied Data Science B.A. Mathematics; B.A. Data Science <i>Relevant Coursework</i> : Machine Learning, Analysis of Algorithms, Data Mining, Knowledge Graphs, Numerical Methods, Probability & Statistics, Data Structures, Data Visualization	2017 – 2021 GPA: 3.90/4.00 GPA: 3.98/4.00
Grants, Awards, and Honors	Herbert E. Grier (1933) and Dorothy J. Grier Fellowship USC Discovery Scholar Prize Epstein Industrial and Systems Engineering Fellowship USC Viterbi School of Engineering Anonymous Endowment Presidential Scholarship Harry A. Miller Endowed Scholarship Academic Achievement Award USC Undergraduate Research Associate Grant Phi Beta Kappa Honor Society	2023 – 2024 2021 2021 2021 2017 – 2021 2019 – 2020 2018 – 2020 2018
Journal Papers	Papers Under Review [1] “Learning Optimal Prescriptive Trees from Observational Data,” N. Jo , S. Aghaei, A. Gómez, P. Vayanos. Major Revision at <i>Management Science</i> , May 2023. <ul style="list-style-type: none">• <u>INFORMS Undergraduate Operations Research Prize Award 2021, Finalist</u>• <u>USC Discovery Scholar Prize 2021</u> [2] “Not (Officially) in My Backyard: Characterizing Informal Accessory Dwelling Units and Informing Housing Policy with Remote Sensing,” N. Jo* , A. Vallebuena*, D. Ouyang, D. Ho. [3] “Drop a Line, Submit on Time? Experimental Evidence on the Effect of Tailored Pedeading Reminders on Pollution Reporting,” E. Benami, N. Jo , D. Ho. December 2022. [4] “ODTLearn: A Python Package for Learning Optimal Decision Trees for Prediction and Prescription,” P. Vossler, S. Aghaei, N. Justin, N. Jo , P. Vayanos, A. Gómez. December 2022.	

Conference Papers

Accepted Papers

[5] “Fairness in contextual resource allocation systems: metrics and incompatibility results,” **N. Jo**, B. Tang, K. Dullerud, S. Aghaei, P. Vayanos. *AAAI Conference on Artificial Intelligence* 2023.

[6] “Learning Fair Optimal Classification Trees: Trade-offs Between Interpretability, Fairness, and Accuracy,” **N. Jo**, S. Aghaei, J. Benson, A. Gómez, P. Vayanos. *AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society*. 2023.

Papers Under Review

[7] “Estimating and Implementing Fairness Metrics with Probabilistic Protected Features,” E. Black, **N. Jo**, H. Elzayn, P. Vossler, D. Ho.

Workshop Papers

[8] “Learning Optimal Prescriptive Trees from Observational Data,” **N. Jo**, S. Aghaei, A. Gómez, P. Vayanos. In *36th AAAI Conference on Artificial Intelligence*, AAAI Workshop on AI for Behavior Change, 2022.

Talks

Conference Presentations

“Learning Optimal Prescriptive Trees from Observational Data”

- INFORMS Annual Conference 2022: Session on Discrete Optimization for Society and Technology
- INFORMS Annual Conference 2021: Session on Interpretable Machine Learning – Exact and Approximation Algorithms
- CORS Annual Conference 2021: Session on ML/OR for Social Good

“Learning Optimal Fair Decision Trees”

- INFORMS Annual Conference 2022: Session on Interpretable Machine Learning for Social Good

Other Research Experience

Regulation, Evaluation, and Governance Lab, Stanford University 2021 – Present
Computational Research Fellow, Principal Investigator: Dan E. Ho

USC Center for Artificial Intelligence in Society 2020 – 2023
Affiliate Researcher, Principal Investigator: Phebe Vayanos

Security and Political Economy Lab, USC 2018 – 2020
Principal Investigator: Benjamin Graham

- Performed data cleanup, analysis, and visualization in R on a 40-variable timeseries dataset with 180 countries to evaluate trends in nations’ laws and its correlation to how governments distribute power

Africa Regional Grant on HIV, UNDP & USC Program on Global Health 2018
Principal Investigator: Laura Ferguson

- Analyzed the progress of sub-Saharan African countries in removing the legal barriers for vulnerable populations living with HIV: an endline evaluation of a United Nations grant

Professional Experience	<p>OutRight Action International, New York City 2021 <i>UN Program Intern</i></p> <ul style="list-style-type: none"> • Monitoring developments at the UN regarding LGBTQI+ issues and drafting communications to governments and UN bodies • Conducting legal research to support civil society advocacy efforts, particularly to advance LGBTQI+ interests <p>Sony Pictures Entertainment, Los Angeles 2019 <i>Data Science Intern</i></p> <ul style="list-style-type: none"> • Revamped various Agile metrics for 80 teams in a pilot project to drive increased operational efficiency • Evaluated competing models that predict upcoming movie earnings to optimize resource allocation
Teaching Experience	<p>University of Southern California 2018 – 2020 <i>Teaching Assistant</i></p> <ul style="list-style-type: none"> • MATH226 Multivariable Calculus (undergraduate level, ~200 students)
Activities and Involvements	<p>MIT EECS Graduate Application Assistance Program (GAAP) 2023</p> <p>USC Kappa Sigma Fraternity 2018 – 2021 <i>VP of Philanthropy, VP of External Relations</i></p> <p>USC Queer & Ally Student Assembly 2018 – 2021 <i>Greek Life Student Liaison</i></p> <p>Joint Educational Program (USC) 2019 <i>Volunteer Teacher</i></p> <ul style="list-style-type: none"> • Taught French to 30 LAUSD students twice a week as part of a volunteer program
Languages	English and Indonesian (native), French (intermediate), Chinese (basic)
Technical Skills	<ul style="list-style-type: none"> • Machine learning in Python using Tensorflow, PyTorch, scikit, matplotlib, etc. • Computer vision tools and frameworks (PIL, Rasterio, OpenCV, etc.) • NLP tools and frameworks (NLTK, spaCy, CoreNLP, etc.) • Optimization and quantitative modelling (using Gurobi) • Large-scale parallel computing using Apache Hadoop, Spark, and Dask • Data management (MongoDB, Apache Suite, etc.) and database modelling • Full-stack web development (HTML, CSS—Bootstrap, Javascript, PHP, etc.) • Other languages: R, SQL, C/C++, Java, Swift