NATHANAEL JO

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Research Interests

Machine Learning; Algorithmic Fairness; AI in Society; Economics and Computation

Academics

University of Southern California, Los Angeles — 2020 – 2021
Master of Science in Applied Data Science — **GPA: 3.90**/4.00
Relevant Coursework: Machine Learning, Analysis of Algorithms, Data Mining, Knowledge Graphs

University of Southern California, Los Angeles — 2017 – 2021
Bachelor of Arts in Mathematics — **GPA: 3.98**/4.00
Bachelor of Arts in Data Science
Relevant Coursework: Numerical Methods, Advanced Statistics, Object-Oriented Programming, Data Visualization and UI Design

Grants, Awards, and Honors

USC Discovery Scholar	2021
Epstein Industrial and Systems Engineering Fellowship	2021
Viterbi School of Engineering Anonymous Endowment	2021
Presidential Scholarship	2017 – 2021
Harry A. Miller Endowed Scholarship	2019 – 2020
Academic Achievement Award	2018 – 2020
Undergraduate Research Associate Grant	2018
Phi Beta Kappa Honor Society	

Journal Articles

Papers Under Review

[1] "Learning Optimal Prescriptive Trees from Observational Data," **N. Jo**, Sina Aghaei, Andrés Gómez, Phebe Vayanos. Request for Revision at *Management Science*.

- INFORMS Undergraduate Operations Research Prize Award 2021, Finalist
- USC Discovery Scholar Prize 2021

[2] "Drop a Line, Submit on Time? Experimental Evidence on the Effect of Tailored Predeadline Reminders on Pollution Reporting," Elinor Benami, **N. Jo**, Daniel Ho. Submitted to *Journal of the Association of Environmental and Resource Economists*.

[3] "ODTLearn: A Python Package for Learning Optimal Decision Trees for Prediction and Prescription," Patrick Vossler, Sina Aghaei, **N. Jo**, Nathan Justin, Phebe Vayanos, Andrés Gómez. Submitted to *Journal of Machine Learning Research*.

Working Papers

[4] "Small Building Detection using Satellite Imagery to Assess the Disparate Impact of California's Accessory Dwelling Unit Liberalization Laws," **N. Jo***, Andrea Vallebueno*, Derek Ouyang, Kit Rodolfa, Daniel Ho.

Conference Proceedings

Accepted Papers

[5] "Fairness in Contextual Resource Allocation Systems: Metrics and Incompatibility Results," **N. Jo***, Bill Tang*, Kathryn Dullerud, Sina Aghaei, Phebe Vayanos. In *37th AAAI Conference on Artificial Intelligence,* 2023.

Working Papers

[6] "Estimating and Implementing Fairness Metrics with Probabilistic Protected Features," Emily Black, **N. Jo,** Hadi Elzayn, Daniel Ho.

[7] "Learning Fair Optimal Classification Trees," **N. Jo**, Sina Aghaei, Andrés Goméz, Phebe Vayanos.

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"

- CPAIOR Annual Conference 2022
- 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 – Present
Visiting 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

Industry Experience

Sony Pictures Entertainment, Los Angeles 2019
Data Science Intern

- 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 pre-release marketing decisions

Teaching Experience

University of Southern California 2018 – 2020
Teaching Assistant

- MATH226 Multivariable Calculus (undergraduate level, ~200 students)

Activities and Involvements

OutRight Action International, New York City 2021
UN Program Intern

- Monitored developments at the UN regarding LGBTQI+ issues and drafted communications to governments and UN bodies
- Conducted legal research to support civil society advocacy efforts, particularly to advance LGBTQI+ interests

USC Kappa Sigma Fraternity 2018 – 2021
VP of Philanthropy, VP of External Relations

USC Queer & Ally Student Assembly 2018 – 2021
Greek Life Student Liaison

Joint Educational Program (USC) 2019
Volunteer Teacher

- 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

- Machine learning using Tensorflow, PyTorch, and Python (scikit, NLTK, etc.)
- Computer vision technologies and frameworks (PIL, Rasterio, OpenCV, 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.)
- Data analysis and visualization using Tableau, WEKA, Excel VBA, etc.
- Cloud and GPU computing (AWS EC2, Google GCP, Azure, etc.)
- Other languages: R, SQL, C/C++, Java, Swift