MATEO DULCE RUBIO

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Personal website ◇ Google Scholar

ACADEMIC POSITIONS

New York University, Center for Data Science
Assistant Professor / Faculty Fellow — *2025 - present*

EDUCATION

Carnegie Mellon University — Pittsburgh, PA
Ph.D. in Statistics and Public Policy — *2020 - 2025*
Advisor: Edward H. Kennedy
Thesis: "Robust Nonparametric Methods for Peacebuilding" (William W. Cooper Doctoral Dissertation Award)
Committee: Edward H. Kennedy, Larry Wasserman, Silvia Borzutzky, Eli Ben-Michael, Joshua Blumenstock

Carnegie Mellon University — Pittsburgh, PA
M.Sc. in Statistics — *2020 - 2022*

University of the Andes — Bogotá, Colombia
M.Sc. in Economics, *Cum Laude* — *2017 - 2019*
Thesis: "Predicting Criminal Behavior with Lévy Flights using Real Data from Bogotá"

University of the Andes — Bogotá, Colombia
B.S. in Economics — *2012 - 2017*
B.S. in Mathematics — *2012 - 2017*

RESEARCH INTERESTS

Theory	Nonparametric statistics, Algorithmic decision making, Causal inference, Statistical machine learning, Responsible AI, Resource allocation, Geospatial data.
Application	Humanitarian mine action, Population size estimation, Public policy, Sustainable development.

FUNDING AS PRINCIPAL INVESTIGATOR

"Statistical Foundations of Residual Risk and All Reasonable Effort in AI-assisted Mine Action". 2026
"Dynamic AI Risk Assessment of EO Contamination". 2025

AWARDS & HONORS

Honorable mention in Geneva International Centre for Humanitarian Demining Innovation Award 2025
Special Distinction for International Organization Advancing Peace, Kluz Prize for PeaceTech 2025
Finalist of the 2025 AI for Good Impact Awards, UN ITU AI for Good Global Summit 2025
William W. Cooper Doctoral Dissertation Award, Carnegie Mellon University 2025
Student of the Year, American Statistical Association (Pittsburgh Chapter) 2025
INFORMS Doing Good with Good OR Competition Finalist 2024
JSM Student Paper Award, American Statistical Association (Social Statistics Section) 2024
K&L Gates Presidential Fellowship in Ethics and Computational Technologies 2024
Outstanding Teaching Assistant Award, Carnegie Mellon University 2023
Graduate Student Assembly/Provost Travel Award, Carnegie Mellon University 2022
Cum Laude M.Sc. in Economics, University of the Andes 2019

PUBLICATIONS & MANUSCRIPTS

Working Papers

Healthcare LLM Benchmarks Are Only as Good as Their Explicit Assumptions.
Naveen Raman*, Santiago Cortes-Gomez*, **Mateo Dulce Rubio***, Fei Fang, Bryan Wilder
arXiv:2605.22612. *GenAI4Health Workshop at NeurIPS. Submitted.*

Doubly-Robust Machine Learning for Population Size Estimation with Missing Covariates: Application to Gaza Conflict Mortality.
Mateo Dulce Rubio, Edward H. Kennedy, Nicholas P. Jewell.
arXiv:2602.09911. *Submitted.*

Population Size Estimation with Many Lists and Heterogeneity: A Conditional Log-Linear Model among the Unobserved.
Mateo Dulce Rubio, Edward H. Kennedy.
arXiv:2407.03539. *Submitted.*
JSM Student Paper Award (Social Statistics Seccion, 2024).

Identification of Hazard Clusters for Priority Landmine Clearance as a Quadratic Knapsack Problem.
Mateo Dulce Rubio.
INFORMS Doing Good with Good OR Finalist.

Journal Articles

Effects of Adolescent Victimization on Offending: Flexible Methods for Missing Data & Unmeasured Confounding.
Mateo Dulce Rubio, Edward H. Kennedy, Valerio Baćak, Daniel Nagin.
The Annals of Applied Statistics 19 (2), 889-906, 2025.

RELand: Risk Estimation of Landmines via Interpretable Invariant Risk Minimization.
Mateo Dulce Rubio* , Siqi Zeng*, Qi Wang, Didier Alvarado, Francisco Moreno, Hoda Heidari, Fei Fang.
ACM Journal on Computing and Sustainable Societies 2 (2), 1-29, 2024.

A Location Discrete Choice Model of Crime: Police Elasticity and Optimal Deployment.
Douglas Newball-Ramírez, Álvaro Riascos, Andrés Hoyos, **Mateo Dulce**.
PLOS One, 19(3), e0294020, 2024.

Modelling Underreported Spatio-Temporal Crime Events.
Álvaro J. Riascos Villegas, Jose Sebastian Nungo, Lucas Gómez Tobón, **Mateo Dulce Rubio**, Francisco Gómez.
PLOS One, 18(7), e0287776, 2023.

Spatio Temporal Sparsity in Homicide Prediction Models.
Álvaro J. Riascos Villegas, Juan S. Moreno Pabón, **Mateo Dulce**, Sebastián Quintero, Johan García, Hernán García.
IEEE Access, 10, 14359-14367, 2022.

Efficient Nearest Neighbors Methods for Support Vector Machines in High Dimensional Feature Spaces.
Diana C. Montañes, Adolfo J. Quiroz, **Mateo Dulce Rubio**, Álvaro J. Riascos Villegas.
Optimization Letters 15 (2), 391-404, 2020.

On the Relationship between the Inhomogeneous Wave and Helmholtz Equations in a Fractional Setting.
Mateo Dulce, Alexander Getmanenko.
Abstract and Applied Analysis. Vol. 2019. Hindawi, 2019.

Conference Articles

The Limits of AI-Driven Allocation: Optimal Screening under Aleatoric Uncertainty
Mateo Dulce Rubio*, Santiago Cortes-Gomez*, Carlos Patino, Bryan Wilder
The Fortieth Annual Conference on Neural Information Processing Systems (NeurIPS), 2026 (Forthcoming).

Continuous Learning for AI-Informed Landmine Risk Assessment
Nirmal Boghara, **Mateo Dulce Rubio**
ICML LatinX in AI Research Workshop; AAAI'26 Spring Symposium on AI for Humanitarian Assistance and Disaster Relief, 2026 (Forthcoming)

Sequentially Auditing Differential Privacy
Tomás González, **Mateo Dulce Rubio**, Aaditya Ramdas, Mónica Ribero
The Thirty-ninth Annual Conference on Neural Information Processing Systems (NeurIPS), 2025.

Conformal Mixed-Integer Constraint Learning with Feasibility Guarantees.
Daniel Ovalle, Lorenz T Biegler, Ignacio E Grossmann, Carl D Laird, **Mateo Dulce Rubio**.
The Thirty-ninth Annual Conference on Neural Information Processing Systems (NeurIPS), 2025.
Spotlight poster.

SESGO: Spanish Evaluation of Stereotypical Generative Outputs.
Melissa Robles, Catalina Bernal. Denniss Raigoso, **Mateo Dulce Rubio**.
Proceedings of the AAAI/ACM Conference on AI, Ethics, and Society (AIES), 2025.
Oral discussion paper.

Statistical Inference Under Constrained Selection Bias.
Santiago Cortés-Gómez, **Mateo Dulce**, Carlos Patiño, Bryan Wilder.
Proceedings of the 41st International Conference on Machine Learning (ICML), PMLR 235:9361-9379, 2024.

Self-exciting point processes with image features as covariates for robbery modeling.
Mateo Dulce, Paula Rodríguez, Juan Moreno, Álvaro Riascos, Jorge Camargo.
Intelligent Computing: Proceedings of the 2021 Computing Conference, Volume 1. Springer International Publishing, 2022.

Visual Representations to Evaluate the Heterogeneous Effects of Urban Parks Restoration on Crime.
Julián Chitiva Bocanegra, Douglas Newball Ramírez, Paula Rodríguez Díaz, Hamadys Benavides Gutiérrez, **Mateo Dulce**, Álvaro Riascos.
Proceedings of the 4th ACM SIGCAS Conference on Computing and Sustainable Societies (COMPASS), 2021.

Interpreting a Conditional Generative Adversarial Network Model for Crime Prediction.
Mateo Dulce, Óscar Gómez, Juan Moreno, Christian Urcuqui, Álvaro Riascos.
25th Iberoamerican Congress on Pattern Recognition (CIARP). Springer, Cham, 2021.

A Fair Allocation Algorithm for Predictive Police Patrolling.
Isabella Rodas, **Mateo Dulce**, Álvaro Riascos.
8th International Conference on Artificial Intelligence & Applications (ARIA), 2021.

Dynamic Network Analysis of Spatio-Temporal Crime Incidents in Bogotá - Colombia.
Juan Moreno, Hernán García, Sebastián Quintero, Johan García, Alvaro Riascos, **Mateo Dulce**.
8th International Conference on Behavioral and Social Computing (BESC), 2021.

Graph Restrictions for Signal Processing of Homicides Data.
Sebastián Quintero, Juan Moreno, **Mateo Dulce**, Álvaro Riascos and Gustavo Nonato.
Proceedings of the International Conference on Applied Artificial Intelligence (ICAPAI), 2021.

Zero-Inflated Embeddings to Analyze Homicide Occurrence Patterns.
Hamadys Benavides, Óscar Gómez, **Mateo Dulce**, Paula Rodríguez, Juan Moreno, Álvaro Riascos.
2nd International Conference on Computing and Data Science (CDS), 2021.

A Manifold Learning Data Enrichment Methodology for Homicide Prediction.
Juan Moreno, **Mateo Dulce**, Álvaro Riascos, Yor Castaño, Paula Rodríguez.
7th International Conference on Behavioural and Social Computing (BESC), 2020.

Accuracy and Fairness in a Conditional Generative Adversarial Model of Crime Prediction.
Christian Urcuqui, Juan Moreno, Carlos Montenegro, Álvaro Riascos, **Mateo Dulce**.
7th International Conference on Behavioural and Social Computing (BESC), 2020.
Best Paper Award Runner-up.

Predicting Criminal Behavior with Lévy Flights using Real Data from Bogotá.
Mateo Dulce.
Documento CEDE No. 2019-11. Master's thesis. Contributed Talk at LXAI Workshop at NeurIPS, 2018.

Efficient Allocation of Law Enforcement Resources using Predictive Police Patrolling.
Mateo Dulce, Simón Ramírez-Amaya and Álvaro Riascos.
NeurIPS 2018 Workshop on Machine Learning for the Developing World (ML4D): Achieving Sustainable Impact, 2018.

Book Chapters

IA para la seguridad pública en América Latina: poder predictivo y responsabilidad algorítmica.
Mateo Dulce Rubio, Juan Moreno, Álvaro J. Riascos Villegas.
Inteligencia artificial en el sector público de América Latina y el Caribe: lecciones aprendidas y hoja de ruta para la acción gubernamental. Ediciones Uniandes y Banco Interamericano de Desarrollo (*Forthcoming*).

Predicción de contaminación con minas antipersonal en Colombia: IA para el desminado humanitario.
Mateo Dulce Rubio, Didier Alvarado.
Inteligencia artificial en el sector público de América Latina y el Caribe: lecciones aprendidas y hoja de ruta para la acción gubernamental. Ediciones Uniandes y Banco Interamericano de Desarrollo (*Forthcoming*).

Randomized Experiments.
Amanda Coston, **Mateo Dulce**, Edward H. Kennedy.
AI for Social Impact. Edited by Milind Tambe, Fei Fang, Bryan Wilder, 2022.

White Papers

Advancements in Mine Action: Enhancing Remote Reporting and Analysis Through Innovative Technologies.
Rory Collins, Lionel Fragniere, **Mateo Dulce Rubio**.
The Journal on Conventional Weapons Destruction, 28(3), 7, 2024.

WORK EXPERIENCE

Apple May 2024 - August 2024
Machine Learning Intern *Seattle, WA*

- Conducted performance assessments of foundation Large Language Models, utilizing synthetic and human annotation data along with robust statistical sampling designs to ensure truthfulness and reliability.

RAND Corporation May 2022 - August 2022
Summer Associate *Pittsburgh, PA*

- Designed, developed, and implemented a pipeline for monitoring emerging trends in the interaction between society, technology, and the criminal justice system, using topic modeling (NLP) on text data and Markov switching models.

Quantil | Applied Mathematics May 2017 - December 2021
Data Mining Associate Director *Bogotá, Colombia*

- Led the development and implementation of spatio-temporal crime prediction models in Bogotá.
- Natural Language Processing for information retrieval, sentiment analysis, and classification of diverse text data sources.
- Applied Machine Learning and Markov chains methods in health data to develop prediction models for risk assessment.
- Conducted fairness auditing of matching algorithms for ridesharing and crime prediction models, ensuring equitable outcomes and promoting transparency and ethical considerations in algorithmic decision-making.

TEACHING EXPERIENCE

Primary Instructor, New York University

Responsible Data Science	Spring, Fall 2026

Primary Instructor, Universidad de los Andes

AI Beyond Prediction: Equity, interpretability, privacy, and uncertainty	Summer 2026

Teaching Assistant, Carnegie Mellon University

Introduction to Causal Inference	Spring 2025
Critical Analysis of Policy Research	Fall 2021, 2022, 2023
Advanced Methods for Data Analysis **(Outstanding TA Award)**	Spring 2022, 2023
Probability and Statistics	Fall 2022, 2023
Introduction to Probability and Statistics	Fall 2022, 2023
Reasoning with Data	Summer 2023
Optimization for Business	Spring 2023
Summer Undergraduate Research Apprenticeship	Summer 2022
Statistics for IT Managers	Fall 2021
Introduction to Statistical Inference	Summer 2021
Introductory Mathematics for Management	Summer 2021
Data over Space and Time	Fall 2020

Lecturer, Universidad de los Andes

Analytics Project Management	Fall 2019
Machine Learning for Business intelligence	Fall 2019
Introduction to Data Analysis in Python	Fall 2019

SERVICE

- **Departmental Service, NYU Center for Data Science:** Faculty Fellow Search Committee (2026, 2027); Master's Admissions Committee (2026).
- **Senior Program Committee:** AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society (AIES 2025, 2026); ACM conference on Equity and Access in Algorithms, Mechanisms, and Optimization (EAAMO 2026).
- **Journal Referee:** Annals of Applied Statistics, Journal of the American Statistical Association, International Journal of Biostatistics, ACM Journal on Computing and Sustainable Societies, *Desarrollo y Sociedad*.
- **Conference Program Committee:** ICML Trustworthy AI for Good Workshop (2026); NeurIPS (2025); EAAMO; (2024); NeurIPS ML4D Workshop (2020, 2021).
- **Workshop Co-organizer:** "Networks, Mechanism Design, and Artificial Intelligence" (University of the Andes, 2026); "Recent Advances in Capture-Recapture Methods for Population Size Estimation" (Joint Statistical Meetings, 2024).
- **Co-founder:** Data Analytics Center for Public Policy, a research initiative dedicated to fostering the advancement of mathematics, data science, and AI for the public sector in Colombia and Latin America (2021 - present).
- **Student Volunteer:** Conference on Uncertainty in Artificial Intelligence (2023).

MEDIA COVERAGE

"AI innovation transforms mine action" (*UNOPS*, 2025)

"Innovative AI tool aims to make demining more effective and safe" (*The New Voice of Ukraine*, 2024).

"Each Year, Landmines Kill Residents of War-Torn Countries. This Innovative Tool Could Save Lives" (*Carnegie Mellon University News*, 2024).

SELECTED PRESENTATIONS

** indicates presentation scheduled for future date*

2026* 40th Annual Conference on Neural Information Processing Systems (NeurIPS, poster).
2026* GenAI4Health Workshop at NeurIPS (poster).
2026 Escuela Superior Politécnica del Litoral.
2026 ICML LatinX in AI Research Workshop.
2026 World Bank, Fragility Forum Clinic - Data, Decisions, and Delivery.
2026 New York University, Impact-Driven Evaluation for AI Lab.
2026 AAAI Spring Symposium on AI for Humanitarian Assistance and Disaster Relief (cancelled).
2026 University of California, Berkeley, PhD Seminar on Theory and Applications of Statistics.
2026 Carnegie Mellon University, Grand Challenge Seminar on Realizing Human Rights.
2026 Carnegie Mellon University, Lab for AI and Social Impact.
2026 University of the Andes, Workshop on Networks, Mechanism Design, and Artificial Intelligence.
2026 New York University, Data Science Seminar.
2025 39th Annual Conference on Neural Information Processing Systems (NeurIPS, spotlight poster).
2025 World Bank Innovation Seminar.
2025 University of Illinois Urbana-Champaign, Machine Learning Seminar.
2025 AAAI/ACM Conference on AI, Ethics and Society (AIES).
2025 Geneva International Centre for Humanitarian Demining Innovation Conference.
2025 Humanitarian Mine Action Innovation and Technology Summit.
2025 Google Privacy Seminar.
2025 AI Tech for Good.
2025 K&L Gates Initiative Conference on Generative AI: Ethics and Governance.
2025 Carnegie Mellon University, Causal Inference Seminar.
2025 Geneva International Centre for Humanitarian Demining Explosive Ordnance Risk Education Advisory Group.
2024 University of California, Berkeley, Department of Statistics Neyman Seminar.
2024 ACM conference on Equity and Access in Algorithms, Mechanisms, and Optimization (EAAMO).
2024 NFORMS Doing Good with Good OR Competition Final.
2024 Geneva International Centre for Humanitarian Demining, AI Applications for Mine Action.
2024 Joint Statistical Meeting GSS/SRMS/SSS Student Paper Competition.
2024 RAND Corporation Statistics Group.
2024 ACM SIGCAS& SIGCHI Conference on Computing and Sustainable Societies (COMPASS)
2024 Carnegie Mellon University, Fienberg Student Research Workshop.
2023 ACM conference on Equity and Access in Algorithms, Mechanisms, and Optimization (EAAMO).
2023 Carnegie Mellon University, Causal Inference Seminar.
2023 International Conference on Health Policy Statistics.
2022 Harvard University, AI for Social Impact.
2022 Carnegie Mellon University, Fairness, Equity, Accountability and Ethics Seminar.
2022 Carnegie Mellon University, K-12 Summit on Artificial Intelligence for Social Good.