Jasone Ramírez-Ayerbe

Curriculum Vitae

Department of Computer Science and Operations Research
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Education

2021–2024 **PhD, Mathematics**, *University of Seville*, Spain.
Title: "Novel mathematical optimization models for group counterfactual analysis".
Supervisors: E. Carrizosa and D. Romero Morales. Date of graduation: 20th September 2024
Awarded with the distinction "cum laude"

2019–2020 : **Master of Mathematics (60 ECTS Credits)**, *University of Seville*, Spain.

2014–2019 : **Bachelor of Mathematics (240 ECTS Credits)**, *University of Seville*, Spain.

2014–2019 : **Bachelor of Physics (240 ECTS Credits)**, *University of Seville*, Spain.

Professional Employment

Oct 2024–Present **Postdoctoral Researcher at the Department of Computer Science and Operations Research** *Université de Montréal*

Aug 2021 –Sep 2024 **Doctoral Candidate at the Department of Statistics and Operations Research** *University of Seville*

Oct2020 – Aug 2021 **Researcher under contract in project "Una Herramienta de Machine Learning para la Actualización y el Desarrollo del Directorio de Empresas y Establecimientos con Actividad Económica en Andalucía" (CEI-23)** *University of Seville*

Journal Articles

2024 Bogetoft P., J. Ramírez-Ayerbe, and Romero Morales. D. Counterfactual analysis and target setting in benchmarking. *European Journal of Operational Research*, volume 315, pages 1083–1095, 2024.

2024 E. Carrizosa, J. Ramírez-Ayerbe, and D. Romero Morales. Mathematical optimization modelling for group counterfactual explanations. *European Journal of Operational Research*, volume 319, pages 399–412, 2024.

2024 E. Carrizosa, J. Ramírez-Ayerbe, and D. Romero Morales. A new model for counterfactual analysis for functional data. *Advances in Data Analysis and Classification*, volume 18, pages 981–1000, 2024.

2024 E. Carrizosa, J. Ramírez-Ayerbe, and D. Romero Morales. Generating collective counterfactual explanations in score-based classification via mathematical optimization. *Expert Systems With Applications*, volume 238, page 121954, 2024.

Preprints

2025 J. Ramírez Ayerbe and E. Frejinger. Relative explanations for contextual problems with endogenous uncertainty: An application to competitive facility location. *arXiv: 2506.19155*, 2025.

2024 A. Lodi and J. Ramírez-Ayerbe. One-for-many counterfactual explanations by column generation. *arXiv: 2402.09473*, 2024.

Working papers

2025   E. Carrizosa, J. Ramírez Ayerbe, and D. Romero Morales. Multistage counterfactual decisions. Technical report, 2025.

Fellowships & Grants

2021 –2024   **Ministry of Science and Innovation Ph.D. Fellowship in the Department of Statistics and Operations Research.** Funding Body: Ministry of Science and Innovation

Jun 2022   **Grant to attend EURO PhD School Data Driven Decision Making and Optimization** Funding Body: Spanish Society of Statistics and Operations Research (SEIO)

Feb 2020-Jul 2020   **Grant to do the Master's thesis** Funding Body: CRIDA A.I.E.

Nov 2019– Jan 2020   **Research initiation scholarship for MSc students at IMUS** *University of Seville.* Funding Body: Fundación de Investigación de la Universidad de Sevilla (FIUS)

Awards

Feb 2025   **Ramiro Melendreras Award Finalist.** Spanish Society of Statistics and Operations Research (SEIO).

Dec 2024   **YoungWoman4OR 2024/2025** *EURO WISDOM Forum.*

Jul 2024   **2024 SEIO - BBVA Foundation Award to the Best Contribution in Statistics and Operations Research applied to Data Science and Big Data.** Awarded for European Journal of Operational Research article "Mathematical Optimization Modelling for Group Counterfactual Explanations" with E. Carrizosa and D. Romero Morales.

Transfer of knowledge

Sept 2021–Apr 2022   **Researcher in Project (MODFUENTES) "Elaboración de un modelo matemático que calcule la concentración de cloro activo en fuentes ornamentales situadas en entorno urbano"** *Participating entity/s: IMESAPI, University of Seville*

Sept 2021–Apr 2022   **Researcher in Project (CORROSIÓN) "Elaboración de un algoritmo matemático que calcule el avance de la corrosión en tiempo en los soportes metálicos de alumbrado urbano, en función de los variables ambientales y estructurales de los soportes"** *Participating entity/s: IMESAPI, University of Seville*

Oct 2020 – Aug 2021   **Researcher in project "Una Herramienta de Machine Learning para la Actualización y el Desarrollo del Directorio de Empresas y Establecimientos con Actividad Económica en Andalucía" (CEI-23)** *Participating entity/s: Institute of Statistics and Cartography of Andalusia, University of Seville*

Invited & contributed talks presented

Jun 2025   **Explaining decisions: from classification to other data-driven optimization problems.** 34th European Conference on Operational Research (EURO 2025). Leeds, United Kingdom.

Jun 2025   **Sparse group counterfactual explanations by column generation.** XLI Congreso Nacional de Estadística e Investigación Operativa (SEIO 2025). Lleida, Spain.

May 2025   **Optimization models for Group Counterfactual Analysis.** Optimization Days (JOPT2025). HEC Montreal. Montreal, Canada.

Feb 2025   **Efficient generation of sparse counterfactual explanations for groups: a column generation approach.** Workshop: Advancing explainable AI through mathematical optimization. Universidad Carlos III de Madrid. Getafe, Spain.

Jul 2024	**A novel column generation framework for one-for-many counterfactual explanations**. 25th International Symposium on Mathematical Programming (ISMP2024). Montreal, Canada.
Jul 2024	**One-for-many Counterfactual Explanations by Column Generation**. 33rd European Conference on Operational Research (EURO 2024). Copenhagen, Denmark.
Jun 2024	**A novel column generation framework for one-for-many counterfactual analysis**. 4th Spanish Young Statisticians and Operational Researchers Meeting (SYSORM). Santiago de Compostela, Spain.
May 2024	**Novel Mathematical Optimization Models to Generate Group Counterfactual Explanations**. ERGO Seminar series. School of Mathematics. The University of Edinburgh, UK.
Jan 2024	**Counterfactual analysis and target setting in benchmarking**. Seminar Series of the Department of Economics, Universidad Pablo de Olavide, Seville, Spain.
Sep 2023	**Optimization models for Counterfactual Analysis: an overview**. Joint QF-STAT PhD Webinars. Stony Brook University, New York, USA.
Jul 2023	**Counterfactual Analysis for Benchmarking: a bilevel approach**. 23rd Conference of the International Federation of Operational Research Societies (IFORS 2023), Santiago, Chile.
Jun 2023	**Group Counterfactual Explanations by means of Mathematical Optimization**. 3rd EUROYoung Workshop, Cergy, France.
Mar 2023	**Soluciones contrafácticas: modelos matemáticos que te dicen qué deberías hacer (con tu vida)**. Ph.D. Seminar organized by the Institute of Mathematics of the University of Seville (IMUS), Seville, Spain.
Dec 2022	**One-to-one and many-to-one Counterfactual Explanations for score-based models**. XXI Latin-Iberoamerican Conference on Operations Research (CLAIO 2022), Buenos Aires, Argentina.
Dec 2022	**Bi-objective Optimization for many-for-many Counterfactual Analysis**. 2nd NeEDS Workshop "On the Latest Advances in Machine Learning to Deal with Complex Data", Copenhagen Business School, Frederiksberg, Denmark.
Nov 2022	**Counterfactual Explanations for Regulatory Benchmarking via Mathematical Optimization**. ECON Brown Bag Seminar - Copenhagen Business School, Copenhagen, Denmark.
Oct 2022	**Generating one-for-one and many-for-one Counterfactual Explanations via Mathematical Optimization**. Invited talk in Technical University of Denmark, Lyngby, Denmark.
Jul 2022	**Generating Collective Counterfactual Explanations in Score-Based Classification via Mathematical Optimization**. 17th Conference of the International Federation of Classification Societies (IFCS 2022), Porto, Portugal.
Jul 2022	**Counterfactual Explanations via Mathematical Optimization with applications to functional data**. 32nd European Conference on Operational Research (EURO 2022), Espoo, Finland.
Jun 2022	**Counterfactual Explanations for Functional Data**. XXXIX Congreso Nacional de Estadística e Investigación Operativa (SEIO 2022), Granada, Spain.
May 2022	**Individual and Collective Counterfactual Explanations for score-based models**. Essex Data Science Seminar Series, Essex, United Kingdom (virtual).
Nov 2021	**Individual and Group Level Counterfactual Explanations via Mathematical Optimization**. New Bridges between Mathematics and Data Science (NBMDS2021), Valladolid, Spain.
Nov 2021	**Counterfactual Explanations via Mathematical Optimization**. ECON Brown Bag Seminar - Copenhagen Business School, Copenhagen, Denmark.

Sept 2021	**Mathematical Optimization for Individual and Group Level Counterfactual Explanations**. International Conference on Operations Research, Bern, Switzerland (virtual).
Jul 2021	**Multi-objective Optimization for Counterfactual Explanations**. 31st European Conference on Operational Research (EURO 2021), Athens, Greece (virtual).
Apr 2021	**Mathematical Optimization for Counterfactual Machine Learning**. 3rd IMA and OR Society Conference on Mathematics of Operational Research, Essex, United Kingdom (virtual).
May 2021	**Distintas formas de cocinar tu sopa de letras**. Ph.D. Seminar organized by the Institute of Mathematics of the University of Seville (IMUS), Seville, Spain.
May 2021	**A unified approach to Counterfactual Explanations by means of Mathematical Optimization**. YOUNG Online Seminar Series Machine Learning NeEDS Mathematical Optimization, IMUS, Seville, Spain (virtual).

Workshops and courses attended

May 2025	**Workshop: Combinatorial optimization and data science**. Centre de Recherches Mathématiques, Montreal, Canada
Jun 2022	**EURO PhD School on Data Driven Decision Making and Optimization**. Institute of Mathematics of the University of Seville (IMUS), Seville, Spain
Jan 2022	**Winter School: Data Science, Optimization and Operations Research**. Speakers: Marco Cuturi and Angelia Nedich - Zinal, Switzerland
Sep 2021	**Optimización al servicio de la Transparencia: Abriendo cajas negras en Inteligencia Artificial**. Speaker: Dolores Romero Morales - Doctoral Program Mathematics and the Mathematical Research Institute of the University of Seville (IMUS), Seville, Spain
Jul 2019	**ECMI Postgraduate/VI Iberian/NeEDS MODELLING WEEK**. Institute of Mathematics of the University of Seville (IMUS), Seville, Spain

Research Projects

Sep 2023–Aug 2027	**Mathematical optimization and statistics for explainable and fair machine learning (PID2022-137818OB-I00)**, Funded by: Ministry of Science and Innovation, Spanish Government Project Coordinator: Dr. Emilio Carrizosa and Dr. Josefa Ramírez Cobo.
Sep 2022–Oct 2024	**Research and Innovation Staff Exchange Network of European Data Scientists - NeEDS (H2020- 822214)**, *Member of the Steering Board as Early Career Researcher*, Funded by: Marie Skłodowska-Curie Actions, European Union's Horizon 2020 Project Coordinator: Dr. Dolores Romero Morales.
Jul 2022–May 2023	**Mathematical Optimization in Data Science: Towards Interpretability in Classification, Regression and Dimensionality Reduction (US-1381178)**, Funded by: Junta de Andalucía, Andalusian Government Principal Investigators: Dr. Emilio Carrizosa.
Dec 2020–Sept 2023	**Mathematical Optimization for Data-Driven Decision-Making (PID2019-110886RB-I00)**, Funded by: Ministry of Science and Innovation, Spanish Government Principal Investigators: Dr. Emilio Carrizosa and Dr. Rafael Blanquero.

Teaching experience

2025   **Université de Montréal**,
Machine Learning Seminar, 2 hours (Master's degree in Computer Science).

2023/2024   **University of Seville**,
Statistics, 60 hours (Bachelor of Health Engineering).

2022/2023   **University of Seville**,
Statistics, 30 hours (Bachelor of Health Engineering),
Linear Models And Experimental Designs, 30 hours (Double BSc in Physics and Mathematics/Double BSc in Mathematics and Statistics/BSc in Mathematics).

2021/2022   **University of Seville**,
Statistics, 30 hours (Bachelor of Health Engineering),
Linear Models And Experimental Designs, 30 hours (Double BSc in Physics and Mathematics/Double BSc in Mathematics and Statistics/BSc in Mathematics).

Professional service

Jun 2025   **Advising Member of the Award Committee for the 2024 Eric Pas Dissertation Prize in Travel Behaviour Research**

Jun 2024   **Co-organizer of the stream "Mathematical Optimization for XAI" within the area of Data Science and Analytics at EURO2024 conference**

Jun 2024   **Co-organizer of the stream "Mathematical Optimization for XAI" within the area of Data Science and Analytics at EURO2024 conference**

Jul 2022   **Co-organizer of the stream "Mathematical Optimization for XAI" within the area of Data Science and Analytics at IFORS2023 conference**

Mar 2022–May 2023   **Co-organizer of the Online Seminars Series Machine Learning NeEDS Mathematical Optimization**

Academic visits

Aug 2023–Dec 2023   **Cornell Tech**, Visiting Ph.D. Student at the Department of Operations Research and Information Engineering, with Prof. Andrea Lodi - 122 days.

Sep 2022–Dec 2022   **Copenhagen Business School**, Visiting Ph.D. Student at the Department of Economics, Frederiksberg, Denmark, with Prof. Dolores Romero Morales and Prof. Peter Bogetoft - 91 days.

Oct 2021   **Copenhagen Business School**, Visiting Ph.D. Student at the Department of Economics, Frederiksberg, Denmark, with Prof. Dolores Romero Morales and Prof. Peter Bogetoft - 14 days.

Editorial work

Since 2021   Ad-hoc reviewer in Computers and Operations Research, TOP, European Journal of Operational Research, INFORMS Journal on Computing, EURO Journal on Computational Optimization, INFORMS TutORials in Operations Research, International Transactions in Operational Research.

Memberships

Since 2022   Member of EUROYoung, a Forum of the European Association of Operational Research Societies (EURO)

Since 2021   Member of the Spanish Society of Statistics and Operations Research (SEIO), belonging to the working group Multivariate Analysis and Classification (AMyC)

Since 2021   Member of the research group FQM - 329 of the University of Seville

Computer skills

Python, R, Matlab, AMPL, Gurobi, Haskell, XHTML, LaTeX, MS Office

Languages

Mother tongue: **Spanish**
Other languages:

	Reading	Listening	Writing	Speaking
English	C2	C2	C2	C1
German	C2	C1	C1	C1

Other interests

I've rounded out my scientific education while keeping my artistic side alive. I hold a Professional Title in Music, specializing in Piano, and have completed three years of advanced studies. Additionally, I find immense joy in reading and cinema, as well as experiencing new cultures through travel.