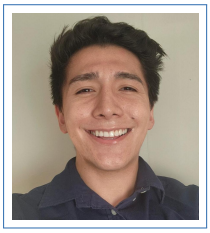

Clemente FERRER

M.Sc. in Mathematics

Research Interests

The interface between Statistics and AI, Extreme Value Theory and Bayesian Nonparametrics.

Education

2024 **Master of Science in Mathematics**, *Universidad Técnica Federico Santa María*, Valparaíso, Chile.

2019 - 2024 **Mathematical Engineering**, *Universidad Técnica Federico Santa María*, Valparaíso, Chile.

Journal Articles

Published

1. **Ferrer, C.**, Vallejos, R. (2025). *Is the effective sample size always less than n? A spatial regression approach*. **Statistics and Probability Letters** 218, 110309.
2. Vallejos, R., **Ferrer, C.**, Mateu, J (2025). *A concordance coefficient for lattice data: An application to poverty indices in Chile*. **Spatial Statistics** 70, 100936.

Submitted

1. De Carvalho, M., **Ferrer, C.**, Vallejos, R. *A Kolmogorov–Arnold Neural Model for Cascading Extremes*. Manuscript submitted to *Extremes* (Under Review).
2. Vallejos, R., Osorio, F., **Ferrer, C**. *A new coefficient to measure agreement between two continuous variables*.Manuscript submitted to *Statistics in Medicine* (Under Review).
3. Vallejos, R., **Ferrer, C.**, Vásquez, A., Díaz, R., Marín, T. *Modeling first-year engineering student performance during the pandemic*. Manuscript submitted to *The New England Journal of Statistics in Data Science*.

Work in preparation

1. De Carvalho, M., **Ferrer, C.**, Vallejos, R. *Transformer-Based Models for Cascading Extremes*.
2. Svetlosak A., De Carvalho, M., He F., Wu W., Lee J., **Ferrer, C.**. *KLAN: Kolmogorov-Lorentz-Arnold Neural Networks*.

Research Projects / Grants

2023-2024 **FONDECYT Project 123001** – *Research Assistant*. Agreement measures for spatio-temporal models with applications to image processing.

2023-2024 **Project OEA232** – *Research Assistant*. Quantification of Academic Performance at USM: Its Spatial Distribution and Evolution During the Pandemic.

Research Visits and Schools

1. School of Mathematics, University of Edinburgh, UK. Research visit to Professor Miguel de Carvalho, September 9–15, 2024.
2. Applied Mathematics School (AMS), CEMSE, KAUST (Saudi Arabia). Fully sponsored one-week program, November 30–December 4, 2025.

Scholarships and Honors

2025 **Marcos Orrego Puelma Award, Chilean Institute of Engineers**
Award to the best national engineering graduate of the 2024 cohort.

2024 **Master's Scholarship, Universidad Técnica Federico Santa María**
Scholarship awarded for outstanding academic performance, consisting of a monthly stipend and tuition fee exemption.

2019-2024 **Recognition on the Academic Excellence List, Universidad Técnica Federico Santa María**
Award for outstanding academic performance, granted for achieving a grade point average of 80 or higher on a scale of 0 to 100.

2019-2024 **Federico Santa María Scholarship, Universidad Técnica Federico Santa María**
Scholarship awarded for outstanding academic performance, consisting of a monthly monetary stipend.

2018 **Perfect Score in University Entrance Exam, Chilean Minister of Education**
Distinction awarded for achieving the highest possible score in the Mathematics section of the Chilean University Selection Test (PSU).

Teaching Experience

Lecturer (*Universidad Andrés Bello*)

2025 Simulation Systems.

Lecturer (*Universidad Técnica Federico Santa María*)

2025 Regression Analysis.
Vector Calculus and PDEs.
Multivariable Calculus and ODEs.
Probability Theory.
Linear Algebra.

Teaching Assistant (*Universidad Técnica Federico Santa María*)

2020-2024 Real Analysis.
Statistical Inference.
Introduction to Mathematical Engineering.
Vector Calculus and PDEs.
Multivariable Calculus and ODEs.
Linear Algebra and Integral Calculus.

Trigonometry and Differential Calculus.

General Physics III.

Industry Experience

2024 Quant Internship at Investment Strategy, AFP Capital.

2023 Data Science Internship at Universidad Técnica Federico Santa María.

Talks as Speaker

1. **Ferrer, C.**, Vallejos, R. *A Spatial Concordance Coefficent for Areal Data*. II Congreso Geoestadística y Estadística Espacio-Temporal: Teoría y Aplicaciones, Concepción, Chile, December 11-15, 2023.
2. **Ferrer, C.**, Vallejos, R., Mateu, J. *A Spatial Concordance Coefficent for Areal Data*. XLVII Jornadas Nacionales de Estadística, Valdivia, Chile, November 16-18, 2024.
3. **Ferrer, C.**, Vallejos, R. *Is the effective sample size always less than the sample size? A spatial regression approach*. III Congreso Geoestadística y Estadística Espacio-Temporal: Teoría y Aplicaciones, Valparaiso, Chile, November 27-29, 2024.
4. **Ferrer, C.**, De Carvalho, M., Vallejos, R. *Exploring Transformer-Based Models for Cascading Extremes*. I Workshop on Generative AI Modelling for Extreme Events, Edinburgh, UK, June 13-14, 2025.

Talks as Coauthor

1. Vallejos, R. (Presenting), Osorio, F., **Ferrer, C**. *A coefficient to measure agreement between two continuous variables based on a L1 norm*. CMStatistics 2023, Berlin, Germany, December 16-18, 2023.
2. Vallejos, R. (Presenting), **Ferrer, C**. *A concordance coefficient for areal data analysis*. METMA XI: 11th International Conference on Spatio-Temporal Modelling, Lancaster, UK, July 23-25, 2024.
3. Vallejos, R. (Presenting), Osorio, F., **Ferrer, C**. *A novel coefficient for assessing agreement between two continuous variables*. 25° SINAPE: Simpósio Nacional de Probabilidade e Estatística 2024, Fortaleza, Brazil, August 04-09, 2024.
4. De Carvalho, M. (Presenting), **Ferrer, C**., Vallejos, R. *A Kolmogorov–Arnold Neural Model for Cascading Extremes*. 2024 IMS International Conference on Statistics and Data Science (ICSDS), Nice, France, December 16-19, 2024.
5. De Carvalho, M. (Presenting), **Ferrer, C**., Vallejos, R. *Neural Statistical Modeling of Cascading Extremes*. 39th International Workshop on Statistical Modelling, Limerick, Ireland, July 13-18, 2025.
6. Svetlosak A. (Presenting), De Carvalho, M., He F., Wu W., Lee J., **Ferrer, C**. *KLAN: Kolmogorov–Lorentz–Arnold neural networks*. CFE-CMStatistics 2025, London, UK, December 13-15, 2025.

Languages

Spanish Native .

English Advanced (IELTS Academic C1, 2025).

Computer skills

Programming	Python, R, C.
ML	PyTorch, TensorFlow, Keras, scikit-learn, pandas, NumPy, Matplotlib.
DL	CNNs, RNNs/LSTMs, Transformers.
LLM tooling	LangChain.
MLOps	Docker, FastAPI.
Databases	SQL.
Software	MATLAB, Mathematica, VSCode, Anaconda.
OS	Windows, macOS.

Selected Technical Projects

1. **EVT-KAN for Extreme-Event Cascade Risk** *(Lead)*
   - Implemented Kolmogorov–Arnold Networks (KAN) in PyTorch and integrated Extreme Value Theory (EVT)-based modeling to predict cascade probability under extreme-event regimes.
   - Designed an end-to-end training/evaluation pipeline (data preprocessing, model training, calibration, and uncertainty-aware scoring for tail events).
   - Led the research direction and experimentation; maintained the codebase with a GitHub workflow and reproducible runs (VSCode).

2. **Generative Modeling of Financial Drawdown Cascades via EVT Tokenization** *(Lead)*
   - Prototyping a Transformer-based generative model to learn the "semantics" of extreme drawdowns in multivariate financial time series.
   - Developed an EVT-driven tokenization scheme for drawdown events and trained sequence models to generate plausible cascade trajectories (e.g., conditional next-asset drawdown given a partial cascade).
   - Running ablations on token design, context length, and conditioning strategy, with a focus on faithful extreme-tail behavior.

3. **DeepInversion: Physics-Grounded Inversion-as-a-Service for Mineral Prospectivity** *(Founder / Solo Builder)*
   - Designing and implementing DeepInversion, a physics-grounded generative inversion pipeline that transforms noisy surface measurements (magnetometry / gravimetry) into 3D probabilistic mineral volumes (e.g., copper/lithium).
   - Implementing a high-performance C forward solver to generate large-scale synthetic datasets for training Physics-Informed Neural Networks (PINNs) and Bayesian inversion models.
   - Focused on efficiency-first simulation, clean interfaces, and a scalable path toward algorithmic IP for industrial deployment.

All codes are available upon request.