Ángel López-Oriona

Postdoctoral Fellow. King Abdullah University of Science and Technology (KAUST), Saudi Arabia

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Education

Bachelor's Degree, Mathematics. University of Santiago de Compostela, Spain.
Master's Degree, Statistical Techniques. University of Santiago de Compostela, Spain.
Master's Degree, Big Data Analytics. European University of Madrid, Spain.
PhD, Statistics. University of A Coruña, Spain.

Academic Theses

Statistical tools for treating data of double stars in the astrometric Gaia Mission (bachelor thesis). Grade: Summa cum laude.

Sales forecast using machine learning techniques (master thesis, Statistical Technique). Grade: Summa cum laude.

Development of a web application for computer vision using deep learning techniques (master thesis, Big Data Analytics). Grade: Summa cum laude.

New methodological contributions in statistical learning for time series (PhD thesis). Grade: Summa cum laude.

Work Experience

2 years (part-time) — **Online Poker Player**, Pokerstars, Remote.
- *Sit & Go specialist*.
- Pokerstars status: *Supernova*. I achieved this position, the second best status for professional online players, after 1 (sabbatical) year of part-time dedication to online poker.
- Verified total net earnings (winnings – losses – taxes): +60,000 (US dollars).

1 year — **Data Scientist**, Estrella Galicia, A Coruña, Spain.
- Development and implementation of new forecasting models, increasing company productivity and efficiency.
- Collaboration with management to prioritize reporting needs, providing analysis and deep insights around critical indicators of the company performance, like gross profit and warehouse efficiency regarding particular products.
- Analysis and processing of complex datasets using advanced querying, visualization and sophisticated tools.

1 year — **Instructor**, European Center for Postgraduate Studies (CEMP), A Coruña, Spain.
- Content creator for a master's degree in Biostatistics.

3 years **PhD Candidate**, University of A Coruña, A Coruña, Spain.
- Construction of machine learning procedures for time series, including clustering, classification and outlier detection algorithms, among others.
- Development of software packages implementing several data mining methods for time series.
- Participation at several conferences and collaboration with international universities through research stays.

Current Position **Postdoctoral Fellow**, King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia.
- Development of statistical models for spatio-temporal datasets, with a focus on solving important environmental problems.

Languages

Spanish **Native Speaker**

English **Certificate of Proficiency in English, University of Cambridge (C2)**

French **Intermediate Level**

Portuguese **Intermediate Level**

Journal Papers

2020 Oriona, A. L., Ling, J. F., & Sellero, C. S. (2020). Photocenter Shift Effect in Double Stars of Gaia DR2 Database. *Acta Astronomica*, *70*, 19-32.

2021 López-Oriona, Á., & Vilar, J. A. (2021). Quantile cross-spectral density: A novel and effective tool for clustering multivariate time series. *Expert Systems with Applications*, *185*, 115677.

2021 López-Oriona, Á., & Vilar, J. A. (2021). Outlier detection for multivariate time series: A functional data approach. *Knowledge-Based Systems*, *233*, 107527.

2021 López-Oriona, Á., & Vilar, J. A. (2021). F4: An All-Purpose Tool for Multivariate Time Series Classification. *Mathematics*, *9*(23), 3051.

2022 Vallejo, Juan A., et al. (2022). Modeling the number of people infected with SARS-COV-2 from wastewater viral load in Northwest Spain. *Science of The Total Environment*, *811*, 152334.

2022 López-Oriona, Á., D'Urso, P., Vilar J. A., & Lafuente-Rego, B. (2021). Spatial weighted robust clustering of multivariate time series based on quantile dependence with an application to mobility during COVID-19 pandemic. *IEEE Transactions on Fuzzy Systems*, *30*(9), 3990-4004.

2022 López-Oriona, Á., Vilar, J. A., & D'Urso, P. (2022). Quantile-based fuzzy clustering of multivariate time series in the frequency domain. *Fuzzy Sets and Systems*, *443*, 115-154.

2022 López-Oriona, Á., D'Urso, P., Vilar J. A., & Lafuente-Rego, B. (2022). Quantile-based fuzzy C-means clustering of multivariate time series: Robust techniques. *International Journal of Approximate Reasoning*, *150*, 55-82.

2022 López-Oriona, Á., & Vilar, J. A. (2022). The bootstrap for testing the equality of two multivariate time series with an application to financial markets. *Information Sciences*, *616*, 255-275.

2023 López-Oriona, Á., D'Urso, P., Vilar J. A., & Lafuente-Rego, B. (2022). Hard and soft clustering of categorical time series based on two novel distances with an application to biological sequences. *Information Sciences*, *624*, 467-492.

2023 López-Oriona, Á., & Vilar, J. A. (2023). Machine learning for multivariate time series with the R package *mlmts*. *Neurocomputing*, *150*, 55-82.

2023 López-Oriona, Á., & Vilar, J. A. (2023). Ordinal Time Series Analysis with the R Package *otsfeatures*. *Mathematics*, *11*(11), 2565.

2023 Trigo-Tasende, N., et al. (2023). Wastewater early warning system for SARS-CoV-2 outbreaks and variants in a Coruña, Spain. *Environmental Science and Pollution Research*, *30*, 79315-79334.

2023 López-Oriona, Á., Weiss, C. H., & Vilar, J. A. (2023). Two novel distances for ordinal time series and their application to fuzzy clustering. *Fuzzy Sets and Systems*, *468*, 108590.

Book Chapters

2023 López-Oriona, Á., Montero-Manso, P., & Vilar, J. A. (2023). Clustering of Time Series Based on Forecasting Performance of Global Models. *Advanced Analytics and Learning on Temporal Data: 7th ECML PKDD Workshop, AALTD 2022, Grenoble, France, September 19–23, 2022, Revised Selected Papers*, (pp. 18-33). Springer International Publishing.

Conference Papers

2021 López-Oriona, Á., D'Urso, P., Vilar J. A., & Lafuente-Rego, B. (2021). Robust Methods for Soft Clustering of Multidimensional Time Series. *Engineering Proceedings*, *7*(1), 60.

2022 López-Oriona, Á., & Vilar, J. A. (2022). The Bootstrap for Testing the Equality of Two Multivariate Stochastic Processes with an Application to Financial Markets. *Engineering Proceedings*, *18*(1), 38.

Conference Proceedings

2021 López-Oriona, Á., & Vilar, J. A. (2021), *An effective tool for clustering multivariate time series with an application to financial markets*. XV Galician Conference on Statistics and Operations Research (SGAPEIO 2021), Santiago de Compostela, Spain, 4-6 November 2021. http://xvcongreso.sgapeio.es/descargas/actas-xvSGAPEIO.pdf.

2021 López-Oriona, Á., D'Urso, P., Vilar J. A., & Lafuente-Rego, B. (2021), *Spatial weighted robust clustering of multivariate time series based on quantile dependence with an application to mobility during COVID-19 pandemic*. 13th International Workshop on Fuzzy Logic and Applications (WILF 2021), Vietri sul Mare, Italy, 20-22 December 2021. http://ceur-ws.org/Vol-3074/paper07.pdf.

2022 López-Oriona, Á., Vilar, J. A., & D'Urso, P. (2022), *Unsupervised Classification of Categorical Time Series through Innovative Distances*. 17th Conference of the International Federation of Classification Societies (IFCS 2022), Porto, Portugal, 19-23 July 2022.

2022 López-Oriona, Á., Vilar, J. A., & D'Urso, P. (2022), *Unsupervised Classification of Categorical Time Series through Innovative Distances*. 4th International Conference on Statistics: Theory and Applications (ICSTA 2022), Prague, Czech Republic, 28-30 July 2022. https://avestia.com/ICSTA2022_Proceedings/files/paper/ICSTA_111.pdf.

Conference Poster Presentations

2021 5th International Workshop on Functional and Operatorial Statistics (IWFOS 2021), Brno, Czech Republic: *Outlier detection for multivariate time series: a functional data approach*.

2023 The KAUST 2023 Workshop on Statistics, Thuwal, Saudi Arabia: *Time series clustering based on prediction accuracy of global forecasting models*.

Conference Oral Presentations

2020 13th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics 2020), London, United Kingdom: *A novel structure-based approach for multivariate time series clustering*.

2021 7th International Conference on Time Series and Forecasting (ITISE 2021), Gran Canaria, Spain: *F4: An all-purpose tool for multivariate time series classification*.

2021 4th XoveTIC Conference for young researchers (XoveTIC 2021), A Coruña, Spain: *Quantile-based fuzzy C-means clustering of multivariate time series: Robust techniques*.

2021 XXV Congress of the Portuguese Statistical Society (SPE 2021), Évora, Portugal: *Quantile-based fuzzy C-means clustering of multivariate time series: Robust techniques*.

2021 13th International Conference on Fuzzy Computation Theory and Applications (FCTA 2021), Virtual: *Fuzzy clustering of multivariate time series based on quantile dependence*.

2021 XV Galician Conference on Statistics and Operations Research (SGAPEIO 2021), Santiago de Compostela, Spain: *An effective tool for clustering multivariate time series with an application to financial markets*.

2021 14th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics 2021), London, United Kingdom: *Spatial weighted robust clustering of multivariate time series with an application to COVID-19 pandemic*.

2021 13th International Workshop on Fuzzy Logic and Applications (WILF 2021), Vietri sul Mare, Italy: *Spatial weighted robust clustering of multidimensional time series based on quantile dependence with an application to mobility during COVID-19 pandemic*.

2022 11th Conference of the Asian Regional Section of the International Association for Statistical Computing (IASC-ARS 2022), Kyoto, Japan: *Soft clustering of multidimensional time series*.

2022 XXIII International Symposium of Mathematical Methods Applied to Sciences (SIMMAC 2022), San José, Costa Rica: *Quantile-based fuzzy clustering of multivariate time series in the frequency domain*.

2022 8th International Conference on Time Series and Forecasting (ITISE 2022), Gran Canaria, Spain: *The bootstrap for testing the equality of two multivariate stochastic processes with an application to financial markets*.

2022 17th Conference of the International Federation of Classification Societies (IFCS 2022), Porto, Portugal: *Unsupervised classification of categorical time series through innovative distances*.

2022 4th International Conference on Statistics: Theory and Applications (ICSTA 2022), Prague, Czech Republic: *Unsupervised classification of categorical time series through innovative distances*.

2022 Joint Statistical Meetings (JSM 2022), Washington, D.C., USA: *Machine learning for multivariate time series with the R package* ***mlmts***.

2022 7th Workshop on Advanced Analytics and Learning on Temporal Data (AALTD 2022), Grenoble, France: *Time series clustering based on prediction accuracy of global forecasting models*.

2022 International Conference on Mathematics, Computational Sciences and Statistics (ICoMCoS 2022), Surabaya, Indonesia: *Unsupervised learning of temporal data based on global prediction models*.

2022 International Conference on Mathematics, Computational Sciences and Statistics (ICoMCoS 2022), Surabaya, Indonesia: *The bootstrap for testing the equality of two multivariate stochastic processes with an application to financial markets*.

2022 14th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics 2022), London, United Kingdom: *Time series clustering based on prediction accuracy of global forecasting models*.

2023 9th International Conference on Time Series and Forecasting (ITISE 2023), Gran Canaria, Spain: *Machine Learning for Multivariate Time Series with the R Package* ***mlmts***.

2023 9th International Conference on Time Series and Forecasting (ITISE 2023), Gran Canaria, Spain: *Clustering of time series based on forecasting performance of global models*.

2023 4th International Conference on Statistics: Theory and Applications (ICSTA 2023), London, United Kingdom: *Fuzzy clustering of ordinal time series based on two novel distances*.

2023 Joint Statistical Meetings (JSM 2023), Toronto, Canada: *Fuzzy clustering of ordinal time series based on two novel distances with financial applications*.

2023 Australian Statistical Conference (ASC 2023), Wollongong, Australia: *Fuzzy clustering of circular time series based on a novel distance with an application to wind data*.

Conference Participations (Coauthor)

2022 32nd European Congress of Clinical Microbiology and Infectious Diseases (ECCMID 2022), Lisbon, Portugal: *COVIDBENS: wastewater-based epidemiology to monitor COVID-19 pandemic and to predict new outbreaks in A Coruña (NW Spain)*. Speaker: Margarita Poza Domínguez.

2022 42nd International Symposium on Forecasting (ISF 2022), Oxford, England: *Improving the Forecasting Accuracy of Global Models/Cross-Learning in Large Datasets by Finding Clusters of Similar Time Series*. Speaker: Pablo Montero-Manso.

2022 17th Conference of the International Federation of Classification Societies (IFCS 2022), Porto, Portugal: *Clusters based on Prediction Accuracy of Global Forecasting Models*. Speaker: Pablo Montero-Manso.

Conference Organizations

2021 13th International Conference on Fuzzy Computation Theory and Applications (FCTA 2021), Virtual. Chairman of Session 1A.

Other Talks

2021 PhD follow-up seminar, University of A Coruña, Spain.

2022 Academic seminar at the Discipline of Business Analytics. The University of Sydney, Business School, Sydney, Australia: *Time series clustering based on prediction accuracy of global forecasting models*.

2022 PhD follow-up seminar, University of A Coruña, Spain.

2022 Academic seminar at the Department of Mathematics and Statistics. Helmut Schmidt University, Hamburg, Germany: *Clustering of categorical time series through innovative distances*.

2023 PhD pre-defence seminar, University of A Coruña, Spain.

2023 PhD defence, University of A Coruña, Spain.

Software

R package mlmts: López-Oriona, Á., & Vilar, J. A. mlmts: Machine Learning Algorithms for Multivariate Time Series, r package version 1.1.1 (2023). URL `https://CRAN.R-project.org/package=mlmts`.

R package ctsfeatures: López-Oriona, Á., & Vilar, J. A. ctsfeatures: Analyzing Categorical Time Series, r package version 1.0.0 (2023). URL `https://CRAN.R-project.org/package=ctsfeatures`.

R package otsfeatures: López-Oriona, Á., & Vilar, J. A. otsfeatures: Ordinal Time Series Analysis, r package version 1.0.0 (2023). URL `https://CRAN.R-project.org/package=otsfeatures`.

Research Stays

PhD stays:

2021 Sapienza University of Rome, Faculty of Statistics. Department of Social and Economic Sciences. Rome, Italy.

- Three-month research stay working on fuzzy clustering of multivariate time series under the supervision of professor Pierpaolo D'Urso.

2022 The University of Sydney, Business School. Discipline of Business Analytics. Sydney, Australia.

- Three-month research stay working on time series clustering and forecasting under the supervision of lecturer Pablo Montero-Manso

2022 Helmut Schmidt University. Department of Mathematics and Statistics. Hamburg, Germany.

- Three-month research stay working on data mining for ordinal time series under the supervision of professor Christian H. Weiss.

2023 Lancaster University. Department of Mathematics and Statistics. Lancaster, United Kingdom.

- One-month research stay working on clustering of nonstationary time series under the supervision of lecturer Carolina Euan.

Courses and Workshops

An Introduction to Hidden Markov Models. Instructor: Franceso Lagona, University Roma Tre, Rome, Italy.

Data Analysis on the Sphere. Instructor: Zubair Khalid, Lahore University of Management Sciences, Lahore, Pakistan.

Awards and Honors

2019 Merit award for academic achievements in Master's Degree at the University of Santiago de Compostela.

2020 Prize to the most accurate Deep Learning model for Computer Vision awarded by the company *International Business Machines* (IBM).

2021 Young researcher grant awarded by the European Society for Fuzzy Logic and Technology (EUSFLAT) for one of the best works presented by PhD students at the 13th International Workshop on Fuzzy Logic and Applications (WILF 2021).

2022 Award by the International Federation of Classification Societies (IFCS) for the best PhD/Postdoc paper at the 17th Conference of the International Federation of Classification Societies (IFCS 2022).

Grants

2020 Competitive grant for PhD students (2020-2022) awarded by the Center for Information and Communications Technology Research (CITIC).

2020 Competitive grant for PhD students (2020-2023) awarded by the Xunta de Galicia.

2021 Competitive grant for a research stay at Sapienza University of Rome awarded by the Xunta de Galicia.

2022 Competitive grant for a research stay at the University of Sydney awarded by the Research Center for Information and Communication Technologies (CITIC) of the University of A Coruña.

2022 Competitive grant for a research stay at the Helmut Schmidt University of Hamburg awarded by the company Inditex in collaboration with the University of A Coruña.

2023 Competitive grant for a research stay at Lancaster University awarded by the Research Center for Information and Communication Technologies (CITIC) of the University of A Coruña.

Research Projects

01/09/2021 - 31/08/2024 Flexible statistical methods in data science for complex and big data: theory and applications.

- Granting institution: Spanish Ministry of Science and Innovation.
- Duration: 3 years.
- Amount: €435,500.
- Principal investigators: Ricardo Cao Abad and Juan Manuel Vilar Fernández.
- Code: PID2020-113578RB-100.

20/09/2023 - 19/09/2025 Research methods for environmental statistics.

- Granting institution: King Abdullah University of Science and Technology.
- Duration: 2 years.
- Amount: -
- Principal investigator: Ying Sun.
- Code: BAS/1/1655-01-01.

Referee of the Following Journals

- *Annals of Operations Research.* (2 reviewed manuscripts)
- *Artificial Intelligence Review.* (1 reviewed manuscript)
- *Computational Statistics.* (1 reviewed manuscript)
- *Expert Systems with Applications.* (1 reviewed manuscript)
- *Fuzzy Sets and Systems.* (1 reviewed manuscript)
- *IEEE Access* (1 reviewed manuscript)
- *Information Sciences* (2 reviewed manuscripts)
- *International Journal of Approximate Reasoning.* (1 reviewed manuscript)
- *Journal of Applied Statistics.* (1 reviewed manuscript)
- *Pattern Recognition* (1 reviewed manuscript)
- *Spatial Statistics.* (2 reviewed manuscripts)
- *Stochastic Environmental Research and Risk Assessment.* (1 reviewed manuscript)

Visitor of the following countries (in order)

- Spain
- France
- The United Kingdom
- Portugal
- Andorra
- Mexico
- Switzerland
- Austria
- Slovakia
- Greece

- Hungary
- Italy
- Vatican City
- Romania
- Bulgaria
- Belgium
- Netherlands
- Australia
- Indonesia
- Qatar
- The United States of America
- Germany
- Poland
- Czech Republic
- Albania
- Japan
- Ireland
- Denmark
- Sweden
- Canada
- The Kingdom of Saudi Arabia
- Turkey
- Singapore