

# Ángel López-Oriona

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

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## Education

**PhD, Statistics.** University of A Coruña, Spain.

**Master's Degree, Big Data Analytics.** European University of Madrid, Spain.

**Master's Degree, Statistical Techniques.** University of Santiago de Compostela, Spain.

**Bachelor's Degree, Mathematics.** University of Santiago de Compostela, Spain.

## Academic Theses

*New methodological contributions in statistical learning for time series* (PhD thesis). 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.

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

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

## Work Experience

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.
- Participation at several conferences and collaboration with international universities.
- Supervision of PhD students.

3 years **PhD Candidate**, UNIVERSITY OF A CORUÑA, A Coruña, Spain.

- Construction of machine learning procedures for time series, including clustering, classification, outlier detection and forecasting 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.

1 year **Instructor**, EUROPEAN CENTER FOR POSTGRADUATE STUDIES (CEMP), A Coruña, Spain.

- Content creator for courses in Statistics.

- 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.
- 2 years **Online Poker Player**, POKERSTARS, Remote.  
(part-time)
- *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).

## Languages

Spanish	<b>Native Speaker</b>
English	<b>Certificate of Proficiency in English, University of Cambridge (C2)</b>
French	<b>Intermediate Level</b>
Portuguese	<b>Intermediate Level</b>

## Journal Papers

- 2024 López-Oriona, Á., & Vilar, J. A. (2024). Analyzing categorical time series with the R package *ctsfeatures*. *Journal of Computational Science*, 76, 102233.
- 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.
- 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., & Vilar, J. A. (2023). Ordinal Time Series Analysis with the R Package *otsfeatures*. *Mathematics*, 11(11), 2565.
- 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., & D'Urso, P. (2023). Hard and soft clustering of categorical time series based on two novel distances with an application to biological sequences. *Information Sciences*, 624, 467-492.
- 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.
- 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., & 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. (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 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.

- 2021 López-Oriona, Á., & Vilar, J. A. (2021). F4: An All-Purpose Tool for Multivariate Time Series Classification. *Mathematics*, 9(23), 3051.
- 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). Quantile cross-spectral density: A novel and effective tool for clustering multivariate time series. *Expert Systems with Applications*, 185, 115677.
- 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.

## Teaching

**Teaching Assistant**, EUROPEAN CENTER FOR POSTGRADUATE STUDIES (CEMP), A Coruña, Spain.

- Course *Introduction to Statistics* (2020/2021). Master's degree in Biostatistics.

## 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.
- 2023 López-Oriona, Á., Vilar, J. A., & D'Urso, P. (2023). Unsupervised Classification of Categorical Time Series Through Innovative Distances. *17th Conference of the International Federation of Classification Societies, IFCS 2022, Porto, Portugal, July 19–23, 2022*, (pp. 233-241). Springer International Publishing.

## Conference Papers

- 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.
- 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.

## Conference Proceedings

- 2023 López-Oriona, Á., Weiss, C. H., & Vilar, J. A. (2023), *Fuzzy Clustering Of Ordinal Time Series Based On Two Novel Distances*. 5th International Conference on Statistics: Theory and Applications (ICSTA 2023), London, United Kingdom, 03-05 August 2023. [https://avestia.com/ICSTA2023\\_Proceedings/files/paper/ICSTA\\_110.pdf](https://avestia.com/ICSTA2023_Proceedings/files/paper/ICSTA_110.pdf).
- 2022 López-Oriona, Á., & Vilar, J. A. (2022), *Machine Learning for Multivariate Time Series with the R Package mlmts*. Joint Statistical Meetings (JSM 2022), Washington, D.C., USA, 06-11 August 2022. [www.amstat.org/meetings/Proceedings/index.cfm](http://www.amstat.org/meetings/Proceedings/index.cfm).
- 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](https://avestia.com/ICSTA2022_Proceedings/files/paper/ICSTA_111.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>.

- 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, 04-06 November 2021. <http://xvcongreso.sgapeio.es/descargas/actas-xvSGAPEIO.pdf>.

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## Conference Poster Presentations

- 2023 The KAUST 2023 Workshop on Statistics, Thuwal, Saudi Arabia: *Time series clustering based on prediction accuracy of global forecasting models*.
- 2021 5th International Workshop on Functional and Operatorial Statistics (IWFOS 2021), Brno, Czech Republic: *Outlier detection for multivariate time series: a functional data approach*.

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## Conference Oral Presentations

- 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*.
- 2023 Joint Statistical Meetings (JSM 2023), Toronto, Canada: *Fuzzy clustering of ordinal time series based on two novel distances with financial applications*.
- 2023 5th International Conference on Statistics: Theory and Applications (ICSTA 2023), London, United Kingdom: *Fuzzy clustering of ordinal time series based on two novel distances*.
- 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 9th International Conference on Time Series and Forecasting (ITISE 2023), Gran Canaria, Spain: *Machine Learning for Multivariate Time Series with the R Package **mlmts***.
- 2022 15th 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*.
- 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 International Conference on Mathematics, Computational Sciences and Statistics (ICoMCoS 2022), Surabaya, Indonesia: *Unsupervised learning of temporal data based on global prediction models*.
- 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 Joint Statistical Meetings (JSM 2022), Washington, D.C., USA: *Machine learning for multivariate time series with the R package **mlmts***.
- 2022 4th International Conference on Statistics: Theory and Applications (ICSTA 2022), Prague, Czech Republic: *Unsupervised classification of categorical time series through innovative distances*.
- 2022 17th Conference of the International Federation of Classification Societies (IFCS 2022), Porto, Portugal: *Unsupervised classification of categorical time series through innovative distances*.
- 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 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 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*.

- 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.*
- 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 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 13th International Conference on Fuzzy Computation Theory and Applications (FCTA 2021), Virtual: *Fuzzy clustering of multivariate time series based on quantile dependence.*
- 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 4th XoveTIC Conference for young researchers (XoveTIC 2021), A Coruña, Spain: *Quantile-based fuzzy C-means clustering of multivariate time series: Robust techniques.*
- 2021 7th International Conference on Time Series and Forecasting (ITISE 2021), Gran Canaria, Spain: *F4: An all-purpose tool for multivariate time series classification.*
- 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.*

## Conference Participations (Coauthor)

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

## Conference Organizations

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

## Other Talks

- 2024 Academic seminar at the Computer, Electrical and Mathematical Sciences and Engineering (CEMSE) Division. King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia: *Fuzzy clustering of circular time series based on a new distance with applications to wind data.*
- 2023 PhD defence. University of A Coruña, A Coruña, Spain.
- 2023 PhD pre-defence seminar. University of A Coruña, 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.*
- 2022 PhD follow-up seminar. University of A Coruña, 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*.
- 2021 PhD follow-up seminar. University of A Coruña, A Coruña, Spain.

## Software

**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>.

**R package ctsfeatures:** López-Oriona, Á., & Vilar, J. A. ctsfeatures: Analyzing Categorical Time Series, r package version 1.2.2 (2023). URL <https://CRAN.R-project.org/package=ctsfeatures>.

**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>.

## Research Stays

### PhD stays:

- 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 (from 10/06/2023 to 10/07/2023).
- 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 (from 20/09/2022 to 20/12/2022).
- 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 (from 01/04/2022 to 30/06/2022).
- 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 (from 05/05/2021 to 05/08/2021).

## Courses and Workshops

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

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

## Awards and Honors

- 2022 Award by the International Federation of Classification Societies (IFCS) for the best work presented by a PhD student at the 17th Conference of the International Federation of Classification Societies (IFCS 2022).

- 2021 Young researcher grant awarded by the European Society for Fuzzy Logic and Technology (EUSFLAT) for the best work presented by a PhD student at the 13th International Workshop on Fuzzy Logic and Applications (WILF 2021).
- 2020 Award by the company *International Business Machines* (IBM) for the development of the most accurate Deep Learning model in the 1st IBM Competition of Computer Vision held in the European University of Madrid.
- 2020 Award (shared with many colleagues) by the Royal Galician Academy of Sciences (RAGC) for the development of a project (called COVIDBENS) for analyzing and monitoring the COVID-19 pandemic in the area of A Coruña.
- 2019 Merit award for academic achievements in Master's Degree at the University of Santiago de Compostela.

## Grants

- 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.
- 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.
- 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.
- 2021 Competitive grant for a research stay at Sapienza University of Rome awarded by the Xunta de Galicia.
- 2020 Competitive grant for PhD students (2020-2023) awarded by the Xunta de Galicia.
- 2020 Competitive grant for PhD students (2020-2022) awarded by the Center for Information and Communications Technology Research (CITIC) of the University of A Coruña.

## Research Projects

- 20/09/2023 **Research methods for environmental statistics.**  
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19/09/2025
- Granting institution: King Abdullah University of Science and Technology (KAUST).
  - Duration: 2 years.
  - Amount: Private.
  - Principal investigator: Ying Sun.
  - Code: BAS/1/1655-01-01.
- 01/09/2021 **Flexible statistical methods in data science for complex and big data: theory and applications.**  
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31/08/2024
- 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.

## Referee of the Following Journals

- *Advances in Data Analysis and Classification.* (1 reviewed manuscript)
- *Annals of Operations Research.* (2 reviewed manuscripts)
- *Artificial Intelligence Review.* (1 reviewed manuscript)
- *Computational Statistics.* (1 reviewed manuscript)
- *Computational Statistics and Data Analysis.* (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)
- *Journal of Computational and Graphical 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)

1. Spain 
2. France 
3. The United Kingdom 
4. Portugal 
5. Andorra 
6. Mexico 
7. Switzerland 
8. Austria 
9. Slovakia 
10. Greece 
11. Hungary 
12. Italy 
13. Vatican City 
14. Romania 
15. Bulgaria 
16. Belgium 
17. Netherlands 
18. Australia 
19. Indonesia 
20. Qatar 
21. The United States of America 
22. Germany 
23. Poland 
24. Czech Republic 

- 25. Albania 
- 26. Japan 
- 27. Ireland 
- 28. Denmark 
- 29. Sweden 
- 30. Canada 
- 31. The Kingdom of Saudi Arabia 
- 32. Turkey 
- 33. Singapore 
- 34. Thailand 
- 35. The United Arab Emirates 
- 36. Egypt 
- 37. Argentina 