Nicolás J. Hernández Banadik

Contact Information

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MRC Biostatistics Unit
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Research Interests

Statistical inference for high-dimensional and functional data; Functional Time Series forecasting, uncertainty quantification and outlier detection; Causal Inference and Machine Learning. Areas of application: the environment, demography, energy, economics, business, finance, health and genetics.

Education

Ph.D. in Statistics. *University Carlos III of Madrid*, Spain 2015 - 2019

Thesis: "Statistical learning methods for functional data with applications to prediction, classification and outlier detection".

Advisor: Alberto Muñoz García. Honors: *cum laude*

MSc in Business and Quantitative Methods. *University Carlos III of Madrid*, Spain 2013 - 2015

Dissertation Topic: "Deep Bootstrap Predictions for Univariate, Multivariate and Functional Time Series.".

Advisor: Juan Romo Urroz

BSc. in Economics. *University ORT*, Uruguay 2007 - 2011

GPA: 8.8/Top 5%

Specialized Training

Ph.D. research visit. *Laboratory ERIC - University Lumière Lyon 2*, France Sep.-Dec. 2018

Topic: Development of forecasting methods and uncertainty evaluation for functional time series.

Sponsors: Ph.D. Julien Jacques and Ph.D. Jairo Cugliari

Policy Impact Evaluation Techniques. *Center for Economic Research (CINVE)*, Uruguay 2012

Advanced Training Programme in Quantitative Methods *Center for Economic Research (CINVE)*, Uruguay 2011 - 2012

Working Experience

IMSS Senior Research Fellow. *Department of Statistical Science, University College of London*, UK 2021 - Present

Research Associate. *MRC - Biostatistics Unit, University of Cambridge*, UK 2019 - 2021

Research and Teaching Fellow *Department of Statistics, University Carlos III of Madrid*, Spain 2013 - 2019

Refereed Journal Publications

Hernández, N., et al. "The flashfm approach for fine-mapping multiple quantitative traits." Nature Communications 12.1 (2021): 1-14.

Martos, G., **Hernández, N.**, Muñoz, A. & Moguerza, J. M. (2018). "Entropy Measures for Stochastic Processes with Applications in Functional Anomaly Detection". Entropy, 20(1), 33.

Muñoz, A., **Hernández, N.**, Moguerza, J. M. & Martos, G. (2018). "Combining entropy measures for anomaly detection". Entropy, 20(9), 698.

Book chapters

N. Hernández, A. Muñoz. (2016). "Kernel Depth Measures for Functional Data with Application to Outlier Detection". Lecture Notes in Computer Science, vol 9887, pp 235-242.

Papers Under Review

"Hernández et al. Simultaneous predictive bands for functional time series using minimum entropy sets. *International Journal of Forecasting*.

Projects In Progress

"Functional data analysis to improve causal inference models with time series observational data.". With P. Samartsidis (University of Cambridge).

"Error correction models for non-stationary functional time series". With J. Cugliari and Julien Jacques (University Lyon 2).

"Domain selection for functional data classification". With G. Martos (University Torcuato Di Tella).

Conference Presentations and Posters

Hernández et al. "A Flexible and Shared Information Fine-mapping Approach with an application to 33 cardiometabolic traits from a Ugandan cohort". (ePoster). Conference of the European Society of Human Genetics, 2021.

Hernández et al. "A Flexible and Shared Information Fine-mapping Approach with an application to 33 cardiometabolic traits from a Ugandan cohort". Follow up seminar, MRC Biostatistics Unit, University of Cambridge, 2020 (virtual).

N. Hernández, Jairo Cugliari & Julien Jacques. "Forecasting Functional Time Series under a Reproducing Kernel Hilbert Space Model". CM-Statistics – ERCIM, Pisa, Italy, December, 2018.

N. Hernández, G. Martos & A. Muñoz. "Domain selection For functional Data Classification". CRoNoS Summer Course on Functional Data Analysis and Software (FDA 2018) , Iasi, Romania, August, 2018.

N. Hernández, G. Martos & A. Muñoz. "A novel domain selection to boost classification problems in Functional Data". 1st CRoNoS International Workshop on Multivariate Data Analysis and Software (MDA 2018) , Limassol, Cyprus, April 3-5, 2018.

N. Hernández, G. Martos & A. Muñoz. "Domain selection For functional Data Classification". 11th International Conference on Computational and Financial Econometrics (CFE 2017) , London, UK, December 16-18, 2017.

N. Hernández, A. Muñoz. "Kernel Depth Function for Functional Data" (Poster). Statlearn'17 - 8th Statlearn workshop a conference of the French Society of Statistics (SFdS), Lyon, France, April 5-8, 2017.

N. Hernández, A. Muñoz. "Kernel Depth Functions for Functional Data with Application to Outlier Detection". 25th International Conference on Artificial Neural Networks, Barcelona, Spain, September 6-9, 2016.

Teaching Experience

University of Cambridge, UK
Lecturer and Assistant Lecturer in Statistics. MPhil in Population Health Sciences. 2019 - present

University Carlos III of Madrid, Spain
Lecturer in Quantitative Methods in Management. MBA 2015 - present
Assistant lecturer in Statistics. Engineering Program for International Students. 2016 - 2019
Lecutrer in Prediction Techniques. BSc in Statistics; BA International Studies 2015 - 2019
Lecturer in Time Series Analysis. BSc. in Statistics; BSc. Finance and Accounting. 2014 - 2019
Assistant lecturer in Statistics. BSc in Business Studies. 2015

University ORT, Uruguay
Lecturer in Mathematics. Bachelor in Business Administration. 2012
Assistant lecturer in Principles of Economics. Bachelor in Economics. 2011 - 2013
Assistant lecturer in Mathematical Economics. Bachelor in Economics. 2009 - 2013

Additional Experience

Department of Economics, CPA-Ferrere Consultants, Montevideo, Uruguay.
Research Analyst **Jan, 2010 - August, 2013**

- Fraud detection models for the National Customs Agency of Uruguay, (DNA)
- Development of an econometric model to estimate the likelihood of underreported income by employees in the manufacturing sector, through the processing of the National Household Survey.
- Estimation of econometric models to develop a Fiscal Risk Map to detect fraudulent companies for the Government Taxation Office (DGI).
- Design of the sample for the survey of net energy consumption in the industrial sector for the Ministry of Industry and Energy.
- Impact analysis on financial inclusion of banking policies.
- Socio–economic impact assessment of a great economic significance iron mining project in Uruguay.
- Estimation of housing demand for low income households of the Institute of Social Security Housing Program.
- Technical Report of the Credit Card Market, analysing the regulatory, efficiency and equity aspects.

Awards and Services

Doctoral stay grant (PPI). Universidad Carlos III de Madrid, 2018.
Scholarship for the *CRoNoS Summer Course on Functional Data Analysis and Software* (Iasi , 2018).
Scholarship for the *CRoNoS Spring Course on Multivariate Data Analysis and Software* (Cyprus, 2018).
Scholarship for Doctoral studies (PIF). Universidad Carlos III de Madrid, 2015 - 2019.
Scholarship for postgraduate studies. Universidad Carlos III de Madrid, 2013-2015.
Reviewer: Neurocomputing; Journal of Applied Sciences; Entropy; Proceedings of the European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning.

Languages

Spanish **Mothertongue**
English **Advanced (Working proficiency)**

Computer Skills

- R (Advanced). Creator and Maintainer of R-packages: 'bigdatatist' and 'fpcb'.
- HPC