Elisa Cabana Garceran del Vall

PhD. Mathematical Engineering (Statistics Specialization)

ORCID: https://orcid.org/0000-0002-2860-5285

GOOGLE SCHOLAR: https://scholar.google.com/citations?user=L_UWawkAAAAJ&hl=es

SCOPUS: https://www.scopus.com/authid/detail.uri?authorId=57211928435

WoS: https://www.webofscience.com/wos/author/record/1919100 (ResearcherID: AAA-3167-2020)

UNIVERSITY EDUCATION

DEGREE IN MATHEMATICS

HAVANA UNIVERSITY, CUBA

SEPT 2008 - JULY 2012

Main subjects of the career: Programming and Algorithms, Mathematical Analysis, Algebra, Geometry, Topology, Numerical Mathematics, Probabilities, Statistics, Optimization, Differential Equations, Theory of Functions of Complex Variable, Measurement and Integration, Functional Analysis, History and Methodology of Mathematics, English Language, Professional Practice. Research projects presented in Scientific Days: Genetic Algorithms, and Algorithms with Estimates of Distributions. Diploma Work: Reaction-diffusion systems with degenerated Hopf Fork and its relationship with oscillating patterns over time.

MASTER IN MATHEMATICAL ENGINEERING (DEPARTMENT OF STATISTICS)

UNIVERSITY CARLOS III OF MADRID, SPAIN

SEPT 2013 - JULY 2015

Main subjects of the degree: 1st Year: Advanced Numerical Methods, Advanced Methods in Matrix Analysis, Real and Complex Analysis, Advanced Statistical Inference, Numerical Linear Algebra, Statistical Modeling, Stochastic Processes, Operational Research. 2nd Year: Multivariate Statistics, Mathematical Statistics, Functional Data Analysis, Optimization, Bayesian Inference. Master thesis: Robust regression based on depth measures for the fMRI problem.

PHD IN MATHEMATICAL ENGINEERING (DEPARTMENT OF STATISTICS)

UNIVERSITY CARLOS III OF MADRID, SPAIN

SEPT 2015 - SEPT 2019

PhD. Thesis: *Robust methods based on shrinkage.*
Defense: September 30, 2019.
Grade: Sobresaliente "Cum Laude".

ANECA ACCREDITATION: Positive for "Ayudante Doctor" since Nov. 16, 2021.

WORK EXPERIENCE

Instituto de Cibernética, Matemática y Física (ICIMAF), La Habana, Cuba
Feb 2010 - April 2010 y Feb 2011 - April 2011
Unpaid work and research practice in the Department of Interdisciplinary Mathematics.

- Research in evolutionary metaheuristics.
- Development of algorithms in MATLAB.
- Presentation of the project in Scientific Days.

Centro de Neurociencias (CNEURO), La Habana, Cuba
Sept 2012 - Feb 2013
Researcher in the R&D Department.

- Study of electrical signals and management of time series (interpretation of EMG and EEG).
- Modeling of different phenomena, stochastic processes and stochastic differential equations.
- MATLAB implementation.

University Carlos III of Madrid, Spain
Sept 2013 - Sept 2019
Teaching assistant and Researcher

- Teaching Statistics course: 381,25 hours (2015-2019).
- Teaching in Spanish and English.
- Correction of: test-type exams, theoretical middle-term exams, practice / problems homework, final and extraordinary exams. Exam monitoring. Support for students in tutorships (2h per week).

IMDEA Networks Institute, Madrid, Spain ([web](#))
April 2020 - actual
Postdoc researcher
Research Projects:

- **Participation in H2020 and Horizon Europe projects**: PIMCITY, DATABRIX, MLEDGE.

- **Participation in National projects**: CONTACT-CM.

- **Writing and submission of Horizon Europe projects:** REALIGN, ALETHEIA, DATABRIX, TRUSPEEDS, ESPIRIT-Health, PARADIGM.

Research Lines:

- **Research Line 1 - [Epidemic spread detection, based on mobile network data](#):** early warning system for predicting epidemic spread and risk of contagion using mobile phone data to detect possible hospitalizations, tracking the risk connections with other users and detecting the most likely places of contagion.
- **Research Line 2 - [Coronasurveys](#):** collaborative project based on data about the COVID-19 pandemic that has been collected since March 2020 via anonymous open surveys. This data allows the production of estimates on the incidence and evolution of COVID-19 using the Network Scale-up Method.

- **Research Line 3 - Data watermarking:** tools for providing a digital watermark for datasets to preserve the ownership rights, an important feature related to privacy and the data economy.

AWARDS

- 2 years Master scholarship at the Department of Statistics, University Carlos III of Madrid, 2013-2015.
- 4 years pre-doctoral scholarship to do the PhD at the Department of Statistics, University Carlos III of Madrid, 2015-2019.
- 2nd Prize Best Poster Competition in the 3rd BYMAT Conference - Bringing Young Mathematicians Together (BYMAT2020), December 1-3, 2020.

COURSES

- COURSE "Grammar and Punctuation" in Coursera. October 2015. Licence: JW6XWM9SKTD5.
- COURSE "R y Python" organized by the Statistics Department of Carlos III University of Madrid, by professor Carlos Gil Bellosta. November – December, 2016. Total 16 hours.
- COURSE "Short course on Robust Statistics using FSDA Matlab Toolbox" organized by the Statistics Department of Carlos III University of Madrid, by professor Silvia Salini from the University of Milán. July, 2017. Total 10 hours.
- COURSE "The Data Scientist's Toolbox" in Coursera, December, 2017. Licence: UMPSHDSWVJ4A.
- COURSE "Topics in Computational Statistics", by Prof. Rubén Zamar, Carlos III University of Madrid, Getafe. May, 2018.
- COURSE "Cómo diseñar y planificar un MOOC/SPOC". Carlos III University of Madrid. June, 2018.
- COURSE "Introducción a Machine Learning" in Escuela de Organización Industrial (EOI – Madrid). Sept– Dec, 2019. Total hours: 273h. Final project: How to learn Sign Language in real time with Neural Networks.
- Tenth Lisbon Machine Learning School – LxMLS'2020 organized by Instituto Superior Técnico, Instituto de Telecomunicaciones and INESC-ID, in Lisbon, Portugal. July, 2020.

SCIENTIFIC PUBLICATIONS

1. Cabana, E., Lillo, R. E. and Laniado, H. Multivariate outlier detection based on a robust Mahalanobis distance with shrinkage estimators. Statistical Papers, 2019. **https://doi.org/10.1007/s00362-019-01148-1**

2. Cabana, E., Lillo, R. E. and Laniado, H. Robust regression based on shrinkage with application to Living Environment Deprivation. Stochastic Environmental Research and Risk Assessment, 2020. **https://doi.org/10.1007/s00477-020-01774-4**

3. Ojo, O., García-Agundez, A., Girault, B., Hernández, H., Cabana, E., et. al. CoronaSurveys: using surveys with indirect reporting to estimate the incidence and evolution of epidemics. **arXiv:2005.12783.** 2020.

4. Cabana, E. and Lillo, R. E. Robust Multivariate Control Chart based on Shrinkage for Individual Observations. Journal of Quality Technology, 2021. **https://doi.org/10.1080/00224065.2021.1930617**

5. Álvarez, J., Baquero, C., Cabana, E. et. al. Estimating Active Cases of COVID-19. **arXiv:2108.03284**. Presented at the 2nd KDD Workshop on Data-driven Humanitarian Mapping, August, 2021.

6. Cabana, E., Lillo, R. E. Robust adjusted discriminant analysis based on shrinkage with application to geochemical and environmental fields. Chemometrics and Intelligent Laboratory Systems. 2022. **https://doi.org/10.1016/j.chemolab.2021.104488**

7. Cabana, E., Lutu, A., Frias-Martinez, E. and Laoutaris, N. Improving epidemic risk maps using mobility information from mobile network data. 30th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems. Seattle, Washington, USA, November, 2022. **https://doi.org/10.1145/3557915.3561012**

8. Cabana, E., Lutu, A., Frias-Martinez, E. and Laoutaris, N. Using mobile network data to color epidemic risk maps. In The 3rd ACM SIGSPATIAL International Workshop on Spatial Computing for Epidemiology (SpatialEpi '22) November 1, 2022, Seattle, WA, USA, 2022. **https://doi.org/10.1145/3557995.3566120**

9. Isler, D., Cabana, E. and Laoutaris N. FreqyWM: Frequency WaterMarking for the New Data Economy. 2022. **https://dspace.networks.imdea.org/bitstream/handle/20.500.12761/1626/main_FreqyWM_2022.pdf**

SCIENTIFIC TALKS

● **Conference** "Robust and scalable methods in fMRI statistical analysis". Duration 1 hour. General University Hospital Gregorio Marañón, Madrid, Spain. During the "Research and Teaching Seminars taught in the medical imaging laboratory - UCME". April 12, 2016. Accredited teaching activity with file number 07-AFOC-05928.4 / 2015.
● **Conference** "How shrinkage can be used for robust methods". Duration 1 hour. Department of Economic Analysis: Quantitative Economics, Faculty of Economic and Business Sciences, Autonomous University of Madrid, Spain. January, 2020.

SCIENTIFIC CONGRESS AND CONFERENCE PRESENTATIONS

1. **Presentation** "Robust regression based on depth measures for the fMRI problem" at the I International Workshop on Advances in Functional Data Analysis (1st International Congress on Advances of Functional Data Analysis), November 11-12, 2015, Getafe, Madrid, Spain.
2. **Presentation** "Robust and scalable methods in fMRI statistical analysis" at the XXXVI National Congress of Statistics and Operational Research (SEIO), September 5-7, 2016, Castilla-La Mancha University, Toledo, Spain.
3. **Presentation** "Outlier detection in multivariate data with robust Mahalanobis distance based on shrinkage estimators" at the CMStatistics 2017 International Congress (10th International Conference of the ERCIM WG on Computational and Methodological Statistics), December 16-18, 2017, University of London, United Kingdom.
4. **Presentation** "Multivariate outlier detection with robust Mahalanobis distance based on Shrinkage" at the XXXVII National Congress of Statistics and Operational Research (SEIO), from May 29 to June 1, 2018 in Oviedo, Asturias, Spain.
5. **Presentation** "Robust regression using a robust Mahalanobis distance based on Shrinkage estimators" at the Statistical Methods for Big Data (SMBD) Congress, 7-8 June, 2018, Carlos III University of Madrid, Spain.
6. **Presentation** "How shrinkage can be used for robust methods" at the 3rd BYMAT Conference - Bringing Young Mathematicians Together, December 1-3, 2020.
7. **Presentation** "Robust Multivariate Control Chart based on Shrinkage for Individual Observations." ISBIS Conference on Statistics and Data Science in Business and Industry. University of Naples Federico II, Naples, Italy. June, 2022.

8. **Presentation** "Robust Multivariate Control Chart based on Shrinkage for Individual Observations." 3rd Spanish Young Statisticians and Operational Researchers (SYSORM). Universidad Miguel Hernández, Elche, Spain. September, 2022.

9. **Presentation** "Improving epidemic risk maps using mobility information from mobile network data." 30th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems. Seattle, USA. November, 2022.

10. **Presentation** "Using mobile network data to color epidemic risk maps." 3rd ACM SIGSPATIAL International Workshop on Spatial Computing for Epidemiology. Seattle, USA. November, 2022.

CONGRESSES ORGANIZATION

● **Member** of the Organizational Committee at the I International Workshop on Advances in Functional Data Analysis (1st International Congress on Advances of Functional Data Analysis), November 11-12, 2015, Getafe, Madrid, Spain.

● **Member** of the Organizational Committee at the 8th International Conference on Mathematical and Statistical Methods for Actuarial Sciences and Finance (MAF), April 4-6, 2018, Madrid.

DIVULGATION ACTIVITIES

1. **Informative activity** "STATWARS, a new hope" of the V edition of the European Night of Researchers in Madrid, 2014. Action framed in Horizon 2020, Framework Program for Research and Innovation of the European Union, under the Marie Sklodowska-Curie Actions.

2. **Workshop** "STATWARS" developed on March, 2016, within the International Student Hall and the Educational Offer (Classroom Fair).

3. **SPOC (Small Private Online Course),** creation of the open and online Statistics course of the Department of Statistics for studies of Engineering Degree in Industrial Technologies of the Carlos III University of Madrid.

4. **ONLINE PUBLICATION** "Artificial Intelligence for learning Sign Language" on Towards Data Science - Medium (link).

5. **TALK** "Inteligencia Artificial para aprender Lengua de Signos" in Women Techmakers Madrid 2020 (link).

6. **SEMINAR** "Inteligencia Artificial para aprender Lengua de Signos" in the uc3m-Santander Big Data Institute, Madrid. November, 2020 (link).

7. **BLOG** Aprende con Eli

8. **TALK** "Inteligencia Artificial para aprender Lengua de Signos" at IWD20Fusion event from the community of WomenTechmakes Spain. December, 2020. (link)

9. **TALK** "ESTIMANDO LA EVOLUCIÓN Y EL RIESGO DE UNA EPIDEMIA UTILIZANDO DATOS DE TELÉFONOS MÓVILES" in Women Techmakers Madrid. April, 2022 (link)

10. **TALK** "Científicas que inspiran" on the XIII edition of the "European Researchers Night" given to young students from 3º and 4º ESO of the IES José de Churriguera, from Leganés, Madrid. February, 2023 (link)

11. **TALK** "Artifical Intelligence for Sign Language" on the XII edition of the "Madrid is Science Fair" at IFEMA, Madrid. March, 2023 (link)

EDUCATIONAL TEACHING

● Teaching **Statistics** course (to 1st year university students at UC3M, **Engineering** careers): **381,25 hours** (2015-2019). **Spanish and English**.

● Lesson of **3 hours** titled: **"Introducción a las Series Temporales"**, on April 19 2023, at the **"Máster en Bioinformática Aplicada a Medicina Personalizada y Salud"**, course 2022-2023 (invited by Escuela Nacional de Sanidad – ISCIII en colaboración con el Centro Nacional de Investigaciones Oncológicas (CNIO), Barcelona Supercomputing Center (BSC) y gestionado por la Sociedad Española de Biotecnología (SEBiot)).

● **Online Courses created by myself:** *13 courses, +40K students, + 3K evaluations.*

LANGUAGES

NATIVE: SPANISH

OTHER: ENGLISH

SOFTWARE

DATA ANALYSIS: PYTHON, R, MATLAB, PSPP, SPSS, STATGRAPHICS.

DOCUMENTS: LATEX, OFFICE.

VIDEO EDITION: CAMTASIA.

SOCIAL MEDIA

TWITTER: https://twitter.com/elisacabana

LINKEDIN: www.linkedin.com/in/elisacabana

PERSONAL WEB: https://elisacabanagarceran.wordpress.com/

LEARNING ACADEMY: www.aprendeconeli.com