PhD Andrés F. López-Lopera

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Current position

Postdoctoral researcher, IMT (Toulouse) – BRGM (Orléans), France **2019 – 2020**
Research projet: *"Risk-Based System for Coastal Flooding Early Warning – Riscope"*.

Research interests

My research interests include machine learning, computer science and applied mathematics. More precisely, stochastic processes, Gaussian processes, Bayesian methods and differential equations.

Education

PhD in Applied Mathematics, Mines Saint-Étienne, France **2016 – 2019**
Title: *"Gaussian process modelling under inequality constraints"* (manuscript written in English).
Supervisor: Prof Olivier Roustant. Co-supervisors: Dr François Bachoc and Dr Nicolas Durrande.
This work was funded by the Chair OQUAIDO.

Master's degree in Electrical Engineering, Universidad Tecnológica de Pereira, Colombia **2014 – 2015**
Title: *"Switched dynamical latent force models for transcriptional regulation"* (manuscript written in English).
Supervisor: Dr Mauricio A. Álvarez.

Bachelor's degree in Electrical Engineering, Universidad Tecnológica de Pereira, Colombia **2008 – 2013**
Title: *"Selection of the best base for the characterization of power quality disturbance signals using time-frequency transforms"* (manuscript written in Spanish).
Supervisor: Dr Mauricio A. Álvarez.

Computer skills

Programming languages: GAMS, Matlab, Python (Jupyter Notebooks), R.
Informatics skills: AutoCAD, Git/Github, Inkscape, LabVIEW, LaTex.
Operating systems: Linux, Windows.

Language skills

Spanish: native.

English: second language – advance level (equivalent to C1).

French: third language – advance level (equivalent to B2).

Publications in international journals

[1] F. Bachoc, A. Lagnoux, and A. F. López-Lopera, "Maximum likelihood estimation for Gaussian processes under inequality constraints," *Electronic Journal of Statistics*, vol. 13, no. 2, 2019.

[2] A. F. López-Lopera, N. Durrande, and M. A. Álvarez, "Physically-inspired Gaussian processes for post-transcriptional regulation in Drosophila," *IEEE/ACM Transactions on Computational Biology and Bioinformatics (TCBB)*, 2019.

[3] A. F. López-Lopera and M. A. Álvarez, "Switched latent force models for reverse-engineering transcriptional regulation in gene expression data," *IEEE/ACM TCBB*, vol. 16, no. 1, 2019.

[4] A. F. López-Lopera, F. Bachoc, N. Durrande, and O. Roustant, "Finite-dimensional Gaussian approximation with linear inequality constraints," *SIAM/ASA Journal on Uncertainty Quantification*, vol. 6, no. 3, 2018.

Proceedings in international conferences

[5] A. F. López-lopera, S. John, and N. Durrande, "Gaussian process modulated Cox processes under linear inequality constraints," in *International Conference on Artificial Intelligence and Statistics (AISTATS), Japan*, 2019.

[6] A. F. López-Lopera, F. Bachoc, N. Durrande, J. Rohmer, D. Idier, and O. Roustant, "Approximating Gaussian process emulators with linear inequality constraints and noisy observations via MC and MCMC," in *International Conference in Monte Carlo & Quasi-Monte Carlo Methods (MCQMC), France*, 2019.

[7] A. F. López-Lopera, M. A. Álvarez, and Á. Á. Orozco, "Sparse linear models applied to power quality disturbance classification," in *Iberoamerican Congress on Pattern Recognition (CIARP), Peru*, 2017.

[8] H. D. Vargas Cardona, A. F. López-Lopera, Á. Á. Orozco, M. A. Álvarez, J. A. Hernández Tamames, and N. Malpica, "Gaussian processes for slice-based super-resolution MR images," in *International Symposium on Advances in Visual Computing (ISVC), USA*, 2015.

[9] A. F. López-Lopera, M. A. Álvarez, and Á. Á. Orozco, "Improving diffusion tensor estimation using adaptive and optimized filtering based on local similarity," in *Iberian Conference on Pattern Recognition and Image Analysis (IbPRIA), Spain*, 2015.

[10] A. F. López-Lopera, H. D. Vargas Cardona, G. Daza-Santacoloma, M. A. Álvarez, and Á. Á. Orozco, "Comparison of preprocessing methods for diffusion tensor estimation in brain imaging," in *Symposium on Image, Signal Processing and Artificial Vision (STSIVA), Colombia*, 2014.

Conferences and workshops

[11] A. F. López-Lopera, "lineqGPR: an R package for Gaussian process regression modelling with linear inequality constraints," in *UseR!, Toulouse, France*. 2019.

[12] A. F. López-Lopera, N. Durrande, F. Bachoc, and O. Roustant, "Gaussian process regression under inequality constraints," in *Méthodes d'Analyse Stochastique pour les Codes et Traitements Numériques (Mascot-Num, acronym in French), Rueil-Malmaison, France*. 2019.

[13] A. F. López-Lopera, F. Bachoc, N. Durrande, and O. Roustant, "Finite-dimensional Gaussian approximation with linear inequality constraints," in *SIAM Conferene on Uncertainty Quantification (SIAM-UQ), Garden Grove, USA*. 2018.

Research activities

PhD student, Laboratoire d'Informatique, Optimisation et Modélisation des Systèmes (LIMOS), France **2016 – 2019**
Research line: *Models and algorithm for decision-making* (MAAD, abbrv. in French).
Theme: *Meta-modelling, continuous optimisation and applications* (MOCA, abbrv. in French).
Chair: Chair in Applied Mathematics OQUAIDO.

Research assistant, project COLCIENCIAS – ECOS Nord, Colombia – France **2015 – 2018**
Title: *"Spatio-temporal probabilistic models based on partial differential equations for describing the regulation dynamic of the Bicoid protein in Drosophila's early embryo segmentation"*.

Young researcher, Universidad Tecnológica de Pereira, Colombia **2014 – 2016**
Title: *"Human-motion synthesis through physically-inspired machine learning models"*. **2016**
Title: *"Sparse latent force models for reverse engineering of multiple transcription factors"*. **2015**
Title: *"Estimation of electrical propagation in the basal ganglia generated by deep brain stimulation in patients with Parkinson's disease"* (project established in Spanish). **2014**

Teaching

Teaching activities, GMI Department, Mines Saint-Étienne, France 2016 – 2019
– Courses on *probability and statistics*, *exploitation of numeric simulators*, *logistics chain* and *research projects*.

Teaching activities, Universidad Tecnológica de Pereira, Colombia 2008 – 2013
Basic sciences: *informatics*, *mathematics* and *classical physics*.
Electrical engineering department: *electric circuits*, *AC machines* and *signal processing*.