ANA FERNANDEZ VIDAL

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EDUCATION

School of Mathematical and Computer Sciences, Heriot-Watt University 2017.09 - 2020.09
PhD in Statistics - Nominated for best PhD thesis award.

School of Engineering, Universidad de Buenos Aires 2011.03 - 2015.03
Master's in Electronic Engineering, GPA: 8.64/10

Instituto Tecnológico de Buenos Aires 2008.03 - 2010.12
Electrical Engineering

WORK EXPERIENCE

Neo4j - World leader in graph database technology 2021.08 - 2022.07
Software Engineer - Machine Learning.

- Work on the Graph Data Science library to implement and optimize machine learning algorithms for graphs (Java and Python).
- Identify and integrate new areas of research and modeling.
- Apply data- and benchmark-driven practices to drive decision-making and design.
- Stay up to date on the machine learning literature to identify relevant techniques, understanding how these relate to each other and to common use cases in the field.

INVAP - First company in Latin America certified by NASA to build satellites and ground stations 2015.11 - 2017.08
Satellite Software Engineer - Aerospace industry.

- Designed and implemented some modules for a SAOCOM satellite simulator (C++ and Python).
- Developed a C++ library for module interconnection which can parse, validate and export many different types of files and formats (JSON, XML, YAML).
- Worked on a module whose function was to simulate networks and data flow inside the satellite.

Theia Consulting SRL 2014.11 - 2015.09
Software Engineer - Aerospace industry.

- Designed and implemented a system for generating, visualizing and editing datasets to be used by different modules of the SAOCOM satellite.
- Developed a C++ backend which allowed to handle many different types of signals and filters employed by the satellite's SAR radar.
- Implemented GUIs in Python using PyQt.
- Created user applications to allow both power and regular users to operate the SAR radar within the SAOCOM satellite. Worked with LAMP infrastructure (Linux, Apache2, PHP and MySQL) and JavaScript.

InterPROAV 2014.06 - 2017.08
Freelance Programming - Audio, Video, Multimedia and Domotics.

AVM Domotia 2012.02 - 2014.06
Project Manager & Developer - Audio, Video, Multimedia and Domotics.

RESEARCH EXPERIENCE

School of Mathematical & Computer Sciences, Heriot-Watt University 2020.05 - 2021.08
Research Associate

- Developed a new metric to measure document-topic allocation quality in a topic model.
- Contributed to a Java pipeline that produces topic map visualisations, focusing on improving the convergence of a collapsed Gibbs sampler that presented some erratic behaviour.
- Research Areas: Topic modelling and mapping, stochastic optimisation in high-dimensional inverse problems, explainable machine learning, mixed membership models.

Mathematical Imaging Group, Heriot-Watt University 2017.09 - 2020.09
PhD Thesis

- Title: Bayesian computation in imaging inverse problems with partially unknown models.
- Developed a new Bayesian stochastic optimisation algorithm for estimating unknown model parameters, that combines modern convex optimisation and stochastic sampling techniques.
- Proposed a new empirical Bayesian method for model selection.
- Research Areas: Mathematical imaging, inverse problems, high-dimensional Bayesian statistical analysis and computation, stochastic optimisation, Markov chain Monte Carlo methods.

Material Optics and Electromagnetic Applications Group, UBA 2015.12 - 2017.03
MEng Thesis

- Title: Study of piezoelectric broadband sensors for optoacoustic applications.
- Developed a mathematical model for broadband piezoelectric polymer sensors and validated it with experimental data. Implemented an interactive tool to model and simulate such sensors.

Centro de Investigación y Desarrollo de Electrónica Industrial, ITBA 2010.03 - 2011.02
Research Assistant

- Industrial R&D - Mathematical modeling of a multilevel current converter.

Instituto Tecnológico de Buenos Aires 2009.03 - 2010.03
Research Project

- ITBA R&D 2009 project "Linking Alternative Energy to the Electrical Network".

SCHOLARSHIPS

James Watt Scholarship 2017 - 2020
Competitive PhD scholarship awarded by Heriot-Watt University.

Becas Jóvenes Profesionales TIC 2015 2016
Competitive MSc scholarship awarded by FONSOFT.

Electrical Engineering Full Scholarship at ITBA 2008 - 2010
Competitive BSc scholarship awarded by AES Corporation.

PUBLICATIONS - JOURNALS AND CONFERENCE PROCEEDINGS

A. F. Vidal, M. Pereyra, A. Durmus and J.F. Giovannelli, "Fast Bayesian model selection in imaging inverse problems using residuals". In *Proc. 2021 IEEE Statistical Signal Processing Workshop (SSP)*, (pp. 91-95), IEEE, Jul. 2021.

V. De Bortoli, A. Durmus, M. Pereyra and A. F. Vidal, "Efficient stochastic optimisation by unadjusted Langevin Monte Carlo. Application to maximum marginal likelihood and empirical Bayesian estimation", Statistics and Computing, 31(3), 1-18, Mar. 2021.

A. F. Vidal, V. De Bortoli, M. Pereyra and A. Durmus, "Maximum likelihood estimation of regularisation parameters in high-dimensional inverse problems: an empirical Bayesian approach. Part I: Methodology and Experiments", SIAM Journal on Imaging Sciences, 13(4), 1945-1989, Nov. 2020.

V. De Bortoli, A. Durmus, M. Pereyra, and A. F. Vidal, "Maximum likelihood estimation of regularisation parameters in high-dimensional inverse problems: an empirical Bayesian approach. Part II: Theoretical Analysis", SIAM Journal on Imaging Sciences, 13(4), 1990-2028, Nov. 2020.

A. F. Vidal and M. Pereyra, "Maximum likelihood estimation of regularization parameters", In *Proc. 2018 25th IEEE International Conference on Image Processing (ICIP)*, (pp. 1742-1746), IEEE, Oct. 2018.

A. F. Vidal, L. Ciocci Brazzano, C. L. Matteo, P. A. Sorichetti and M. G. González, "Parametric modeling of wideband piezoelectric polymer sensors: Design for optoacoustic applications". *Review of Scientific Instruments*, 88(9), 095004, Sep. 2017.

A. F. Vidal, M. G. González and P. Sorichetti, "Sensores piezoeléctricos para aplicaciones optoacústicas: Efectos de los procesos de relajación". In *Proc. Biennial Congress of Argentina (ARGENCON), 2016 IEEE* (pp. 1-5), IEEE, Jun. 2016.

PRESENTATIONS - CONFERENCES, SEMINARS AND WORKSHOPS

Oral presentation "Maximum likelihood estimation of regularisation parameters in high-dimensional inverse problems: an empirical Bayesian approach". Presented at the *Probability in the North-East (PiNE) Meeting*, ICMS, Edinburgh, UK, Jan. 2020.

Oral presentation "Maximum likelihood estimation of regularisation parameters: an empirical Bayesian approach". Presented at the *2nd IMA Conference On Inverse Problems From Theory To Application*, University College London, London, UK, Sep. 2019.

Poster "Maximum likelihood estimation of regularisation parameters in imaging problems - an empirical Bayesian approach". Poster presented at *Annual PhD Poster Session*, School of Mathematical and Computer Sciences, Heriot-Watt University, Edinburgh, UK, Jun. 2019. *Best poster award.*

Poster "Maximum likelihood estimation of regularisation parameters in imaging problems". Poster presented at *The Mathematics of Imaging - Winter school poster event*, Centre International de Rencontres Mathématiques, Marseille, France, Jan. 2019.

Oral presentation "Maximum likelihood estimation of regularisation parameters". Presented at the *Statistical Signal Processing (SSP) Workshop 2018*, STOR-i Centre for Doctoral Training, Lancaster University, Lancaster, UK, Apr. 2018.

Seminar "Maximum likelihood estimation of regularisation parameters in imaging inverse problems". *Actuarial Mathematics and Statistics Seminar*, School of Mathematical and Computer Sciences, Heriot-Watt University, Edinburgh, UK, Apr. 2018.

Poster "Parametric modeling of wideband piezoelectric polymer sensors for optoacoustic applications". Poster presented at *SIPLab Winter poster event*, Institute of Sensors, Signals and Systems, School of Engineering and Physical Sciences (EPS), Heriot-Watt University, Edinburgh, UK, Dec. 2017.

Oral presentation A. F. Vidal, M. G. González, and P. Sorichetti, "Sensores piezoeléctricos para aplicaciones optoacústicas: Efectos de los procesos de relajación". In *Proc. Biennial Congress of Argentina (ARGENCON), 2016 IEEE* (pp. 1-5). IEEE, Buenos Aires, Argentina, Jun. 2016.

REFERENCES

Dr. Marcelo Pereyra PhD Supervisor
Associate Professor
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