Rafael **Cabral**

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Summary

As a statistics researcher, I specialize in applied and computational statistics. My PhD work revolves around building more flexible, robust, and computationally efficient modeling frameworks for spatial and temporal data. I've worked with Gaussian and non-Gaussian processes, model criticism and robustness, and approximate inference with MCMC, INLA, and variational inference. I am currently working in Bayesian Computational Statistics & Modeling group with Prof. Håvard Rue.

At KAUST, I have also been the teaching assistant of the Stochastic Processes course and was the student ambassador of the Statistics department. Prior to starting the PhD, I did internships in the industry in data science, deep neural networks, and image segmentation.

Education

Ph.D. in Statistics — *Saudi Arabia*
KAUST — *2020 - 2023*
- Dean's list for 2021/2022.
- Supervised by Profs. Håvard Rue and David Bolin

M.Sc. in Applied Mathematics — *Lisbon, Portugal*
Instituto Superior Técnico - University of Lisbon — *2017 - 2019*
- Thesis entitled Space-time trends and dependence of wind extremes in north-western Germany.
- Top degree in Portugal: the lowest entry grade is 18.35/20.

B.Sc. in Engineering Physics — *Lisbon, Portugal*
Instituto Superior Técnico - University of Lisbon — *2014 - 2017*
- Top degree in Portugal: the lowest entry grade is 18.9/20.

Publications

Fitting latent non-Gaussian models using variational Bayes and Laplace approximations
R. Cabral, D. Bolin, and H. Rue, *arXiv* (preprint) — *2022*
- Paper: `bayesian-analysis`
- R package: `github.com/rafaelcabral96/ngvb/`

Controlling the flexibility of non-Gaussian processes through shrinkage priors
R. Cabral, D. Bolin, and H. Rue, *Bayesian Analysis* (in print) — *2022*
- Paper: `arxiv.org/abs/2203.05510`
- Github: `github.com/stan-dev/connect22-space-time`

Space-time trends and dependence of precipitation extremes in north-western Germany
R. Cabral, A. Ferreira, and P. Friederichs, *Environmetrics* — *2019*
- Paper: `doi.org/10.1002/env.2605`

A price model with finitely many agents
A. Alharbi, T. Barkaryan, R. Cabral, et al., *Bulletin of the Portuguese Mathematical Society* — *2019*
- Paper: `hdl.handle.net/10754/662310`

Leadership experience

Student Ambassador — *Saudi Arabia*
KAUST — *2021 and 2022*
- Represented the CEMSE division and aided in its recruitment efforts.
- Promoted the Statistics program abroad.

Teaching assistant on the stochastic processes course — *Saudi Arabia*
KAUST — *2020-2022*
- Mandatory course in M.Sc./Ph.D. in Statistics and Electrical Engineering with 45 attending students.
- Designed course projects, weekly homeworks and graded exams and projects.
- Delivered weekly lectures where I solved the homework live and answered students' questions.

Professional Experience

Internship on Optimization *Saudi Arabia*
KAUST *2019*
- Implemented and improved a particle-swarm optimization algorithm
- Application to non-convex function optimization and machine learning problems.
- Python (Numpy and Tensorflow).

Data Science Internship *Lisbon, Portugal*
Odysai *2018*
- Startup developing Docdigitizer, a product that automatically extracts information from documents using machine learning.
- Data processing tasks using Python.
- Designed real-time analytics dashboards to understand user behavior and product performance.

Deep Learning Internship *Lisbon, Portugal*
Hospital da Luz Learning Health *2018*
- Won the IST Enterprise Challenge competition on how AI can aid the medical industry.
- Applied deep learning algorithms to segment 3D medical images automatically.
- Convolutional neural networks in Python (Keras and Tensorflow).

Data Science Spring Program *Lisbon, Portugal*
BNP Paribas *2018*
- Worked with Alteryx for data processing and Tableau for data visualization.

Attended conferences and workshops

StanConnect 2022: Stan Through Space and Time *Online*
2022
- Speaker: Robust non-Gaussian models and how to fit them in Stan.
- `github.com/stan-dev/connect22-space-time`

Summer school: Statistics for Point Patterns in Space and Beyond *Aalborg, Denmark*
Aalborg University *2022*
- Attended classes given by Professors Jesper Møller and Rasmus Waagepetersen.

2022 ISBA world meeting *Montreal, Canada*
International Society for Bayesian Analysis *2022*
- Poster: Controlling the flexibility of non-Gaussian processes through shrinkage priors

Awards

2022	**Al-Kindi Statistics Research Student Award**, a research award for top Statistics Ph.D. students at KAUST	*Saudi Arabia*
2022	**McKinsey & Company**, Forward program	*Saudi Arabia*
2022	**Dean's list award**, during Ph.D. at KAUST	*Saudi Arabia*
2020-2022	**Ph.D. progress rated as Outstanding (A+)**, by the KAUST evaluation committee	*Saudi Arabia*
2019	**Research fellowship grant**, for the development of research work in extreme value theory (FCT-BL299/2018)	*Portugal*
2019	**Diploma of academic merit**, for great performance in the M.Sc. in Applied Mathematics	*Portugal*
2017	**Diploma of academic merit**, for great performance in the B.Sc. in Engineering Physics	*Portugal*
2013	**Asteroid Discovery Award**, International Astronomical Search Collaboration. Confirmed asteroid by the Minor Planet Center of the University of Harvard with name 2013 EZ7	*Portugal*

Referrals

Håvard Rue
Professor, Statistics
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KAUST, Saudi Arabia

David Bolin
Associate Professor, Statistics
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KAUST, Saudi Arabia