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Joaquin Cavieres

Summary

I am a postdoctoral researcher in the "Chair of Spatial Data Science and Statistical Learning" at Georg-August-Universität Göttingen. Previously, I was a postdoctoral researcher in the "Chair of Geoinformatics - Big Spatial Data" at Bayreuth University. I earned a doctoral degree in Statistics from Universidad de Valparaíso in 2022 and a Master in Statistics in the same University in 2016.

Education

Dr. in Statistics, Universidad de Valparaíso — Valparaíso, Chile
Thesis: Computational methods for a smoothing thin plate spline in spatial models. — 2018–2022

Master in Statistics, Universidad de Valparaíso — Valparaíso, Chile
Thesis: "Bayesian inference and spatio-temporal modeling" — 2014–2016

Fishery Engineer, Pontificia Universidad Católica de Valparaíso — Valparaíso, Chile
Thesis: "Non linear optimization applied to fishery sciences" — 2006–2012

Research Experience

Georg-August-Universität Göttingen — Göttingen, Germany
Postdoctoral researcher in the"Chair of Spatial Data Science and Statistical Learning" — 1 November 2023 - Present

- Project: "Approximated Gaussian Random Field Under Different Parameterizations for MCMC".

Bayreuth University — Bayreuth, Germany
Postdoctoral researcher in the "Chair of Geoinformatics-Big Spatial Data" — 19 October 2022 - 31 October 2023

- Project: "Bayesian semiparametric spatial model using Template Model Builder (TMB)".

Researcher, Universidad de Valparaíso — Valparaíso, Chile
Project: "Decretion disks and flows around fast-spinning stars" — 2022

- Bayesian Inference and Probabilistic Modeling

King Abdullah University of Science and Technology, KAUST. — Thuwal, Saudí Arabia
Research intern at Computer, Electrical, and Mathematical Sciences and Engineering Division. — 2021

- Bayesian Inference applied to Spatial Models.
- `Software: Template Model Builder (TMB) and tmbstan`

Aalto University — Espoo, Finland
Research intern at Department of Computer Science — Summer 2019

- Bayesian Inference for a Spatio-Temporal Model.
- `Software: Template Model Builder (TMB) and tmbstan`

Technical University Federico Santa María — Santiago, Chile
Research assistant — Summer 2013

- Assistant at Center of Scientific Research of the Department of Industries (CIDIEN, in spanish)

Privates Companies

BHP billiton (Consultant) Santiago, Chile
Statistical modelling 2022

- Production planning under uncertainty using statistical modelling and simulations.

Arauco Celulosa (Full-time) Concepción, Chile
Data Scientist 2021

- Machine learning models with applications to industrial processes (automation)

Cencosud-Scotiabank (Full-time) Santiago, Chile
Data Scientist 2018 - 2019

- Machine learning models with applications in customer behaviour for retail business.

Instituto de Fomento Pesquero (Full-time) Valparaíso, Chile
Researcher 2013 - 2018

- Stock assessments: Langostino amarillo (*Cervimunida johni*) and Langostino Colorado (Pleuroncodes monodon).
- `AD-model builder`, Generalized Linear Models (GLM's) and Generalized Linear Mixed Models (GLMM's) with `R`

Teaching

- **Computational Statistics** Summer semester 2025
  Universität Göttingen
- **Spatial Statistics** Winter semester 2024
  Universität Göttingen
- **Advanced Spatial Modelling (seminar)** Winter semester 2024
  Universität Göttingen
- **Computational Statistics** First semester 2024
  Universität Göttingen
- **Advanced Spatial Modelling (seminar)** Summer semester 2023
  Universität Göttingen
- **Statistical Methods for Spatial Data Analysis** Summer semester 2023
  Bayreuth University
- **Introduction to Numerical Analysis** Summer semester 2023
  Bayreuth University
- **Numerical Analysis** First semester 2022
  Universidad de Valparaíso
- **Numerical Analysis.** First semester 2021
  Universidad de Valparaíso
- **Non Parametric Statistics** Second semester 2020
  Universidad de Valparaíso
- **`R` and `Python` for quantitative analysis in marketing, Business School** Second semester 2019
  Pontificia Universidad Católica de Valparaíso
- **Dynamics of Populations** Second semester 2016
  Pontificia Universidad Católica de Valparaíso

Publications

1. **Cavieres, J.**, Monnahan, C.C., Bolin, D., and Elisabeth Bergherr., 2024. Approximated Gaussian Random Field Under Different Parameterizations for MCMC. *Developments in Statistical Modelling* (https://doi.org/10.1007/978-3-031-65723-8_32).

2. Escárate, P, Curé, M., Araya, I., Coronel, M., Cedeño, A.L., Celedon, L., **Cavieres, J.**, Aguero, J.C., Arcos, C., Cidale, L.S., Levenhagen, R.S., Pezoa, R., and Diáz, S.Simpon., 2023. A method to deconvolve stellar profiles: The Non-Rotating Line utilizing Gaussian Sum Approximation. *Astronomy & Astrophysics* (https://doi.org/10.1051/0004-6361/202346587).

3. Lu, M., **Cavieres, J.**, Moraga, P., 2023. A comparison of spatial and nonspatial methods in statistical modeling of NO_2: prediction, accuracy, uncertainty quantification, and model interpretation. *Geographical analysis* (https://doi.org/10.1111/gean.12356).

4. **Cavieres, J**., Ibacache-Pulgar, G., Contreras-Reyes, J.E, 2022. Smoothing thin plate spline under skew-normal settings using Laplace approximation and influence diagnostic analysis. *Journal of Statistical Computation and Simulation* (https://doi.org/10.1080/00949655.2022.2090564).

5. **Cavieres, J**, Monnahan, C.C, Vehtari, A., 2021. Accounting for spatial dependence improves relative abundance estimates in a benthic marine species structured as a metapopulation. *Fisheries Research*, 240, 105960 (https://doi.org/10.1016/j.fishres.2021.105960).

6. **Cavieres, J**., Nicolis, O., 2018. Using a spatio-temporal Bayesian approach to estimate the relative abundance index of yellow squat lobster (Cervimunida johni) of Chile. *Fisheries research*, 208, 97-104. (https://doi.org/10.1016/j.fishres.2018.07.002).

Publications (in press)

1. **Cavieres, J**., Monnahan, C.C., Moraga, P., 2024. Why not a thin plate spline for spatial models? A comparative study using Bayesian inference (*Arkiv* preprint: https://arxiv.org/abs/2404.12756).

2. **Cavieres, J**., Karkulik, M., 2022. Efficient estimation for a smoothing thin plate spline in a two-dimensional space (*Arkiv* preprint: https://arxiv.org/abs/2404.01902)

Conferences & Workshops

1. **Cavieres, J**., Monnahan, C.C., Bolin, D., Bergherr, E., 2024. Approximated Gaussian random field under different parameterizations for MCMC. International Workshop on Statistical Modelling 2024, Durham, England.

2. **Cavieres, J**., Moraga, P., Monnahan, C.C., 2023. Bayesian semiparametric spatial model using Template Model Builder (`TMB`). CFE-CMStatistics Conference 2023, Berlin, Germany.

3. **Cavieres, J**., Monnahan, C.C., Moraga, P., 2023.A semiparametric thin plate spline spatial model using Bayesian computation. Statistical Computing 2023, Günzburg, Germany.

4. Cure, M., Arcos, C., Araya, I., Escarate, P., Celedon, L., **Cavieres, J**., Pezoa, R., Olivares, E., Farias, G., 2022. Bayesian deconvolution of a rotating spectral line profile to a non-rotating one. *XXXI General Assembly of international Astronomical Union, Busan, Republic of Korea.*

5. **Cavieres, J**., 2021. Combining all the pieces together to create an efficient full Bayesian geostatistical model: The SPDE method in `Stan`. *2do Workshop de Estadística: Contribuciones de Posgrado. Sociedad Chilena de Estatística (SOCHE).*

6. **Cavieres, J**., Moraga, P., 2021. Fitting spatial random field models using `Stan` and the SPDE approach: implementation via `TMB` and a comparative study of two different parametrizations. *End-to-end Bayesian learning*, Marseille, France.

7. **Cavieres, J**., 2019. Incorporating the spatial dependence with physical barriers in a bayesian spatio-temporal model to obtain a relative index of abundance. *StanCon2019, Cambridge, England.*

8. Plaza, F., **Cavieres, J**., Salas, R., Nicolis, O., 2018. Deep learning approach for seismic risk assessment in Chile. *XIV IEEE Latin American Summer School in Computational Intelligence.*

9. **Cavieres, J**., Nicolis, O. 2016. Bayesian spatio-temporal modelling for analyzing the sea urchin (*Loxechinus albus*) fishery in Chile. *COBAL V (Congreso de Estadística Bayesiana de America Latina) , Guanajuato, México.*

Skills

- **Programming:** `R`, `Template Model Builder (TMB)`, `Stan`, C++ (`Rcpp/RcppArmadillo`), `Python`
- **M. Learning:** `h2o`, `Tensorflow`
- **Tools/Techs:** `LaTeX`, `Git`

Languages

- **English:** Speak: Intermediate level, Written: Intermediate level

Courses

- "Winter School on Hierarchical Matrices 2024", Kiel University, Germany 2024
- "Probabilistic Numerics" spring school, Universität Tübingen, Germany 2023
- "Fitting hierarchical models with `TMB`", Universidad de Concepción 2017
- "Spatial models with `INLA`", Pontificia Universidad Católica de Valparaíso 2016
- "Stock assessment advanced". Course training, ICES, Copenhague, Denmark 2016
- "Bayesian modelling and hierarchical modelling of spatial data", Universidad de Valparaíso 2016

Projects

See full list of projects on github.com/jcavieresg