

GUILLERMO NAVAS PALENCIA

PERSONAL INFORMATION

Nationality Spanish
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EDUCATION

Doctor of Philosophy in Computing
09/2015 - 07/2019 Universitat Politècnica de Catalunya, Barcelona
Computational Mathematics and Number Theory.
Thesis: *High-precision computation of uniform asymptotic expansions for special functions.*
Honors: Excellent Cum Laude.

Visiting PhD Researcher
05/2017 - 06/2017 Universidad de Cantabria, Santander
Hosts: Prof. Javier SEGURA and Prof. Amparo GIL

Master's degree in Statistics and Operations Research
09/2014 - 01/2016 Universitat Politècnica de Catalunya, Barcelona
Mathematical optimization specialization.
Thesis: *Portfolio Credit Risk: Models and Numerical Methods.*

Postgraduate in Financial Mathematics
10/2012 - 07/2013 Universitat Politècnica de Catalunya, Barcelona
Main topics: Numerical methods for Finance, asset management and quantitative risk management.

Bachelor's degree in Mechanical Engineering
09/2008 - 07/2012 Universitat Politècnica de Catalunya, Barcelona
EUETIB-UPC
Thesis: *Design of a plastic bi-material injection mould with metallic inserts.*

WORK EXPERIENCE

Morningstar DBRS
07/2021 - present Vice President Madrid
European Quantitative Analytics - Structured Finance Analytics.

- Creator and Lead developer of the new Portfolio Credit Model library (multiple asset classes, CMBS/CLO/CDO) in Python and C++ supporting CPU and GPU.
- Development of new methodologies for CMBS, RMBS and consumer ABS models.
- Review and optimization of several simulation engines.
- Research in semi-analytical methods (Portfolio Laplace transform and asymptotic approximations), stress testing and scenario analysis for credit risk models.
- Team lead. Lead Python developer, mentoring juniors on Python development.
- Impact Equity Award 2022.

Aplazame
04/2021 - 06/2021 Senior data scientist Madrid
Research and development in credit risk and fraud modelling.

BBVA
11/2017 - 03/2021 Manager data scientist Madrid
Lead quantitative researcher/developer in Global Risk Management (GRM). Research in mathematical optimization and statistical modelling.

- Team leader of 6 data scientists. Responsible for hiring and mentoring technical staff.
- Creator and lead developer (Python/Spark/C++) of the GRMLab library, the new BBVA analytical framework for credit risk modelling. Presented to CEO Onur Genç.
 - Achievements: development of robust and accurate credit risk models in minutes.
- Development of new algorithms and methodologies for IFRS9 risk parameters calibration (PD/LGD/EAD). Development of mathematical programming formulation for segmentation/calibration and binning.
 - Achievements: 99% reduction in CPU times and up to 50% increase in prediction.

University of Navarra	10/2020 - 10/2021	Associate professor	Madrid
		Master in Big Data Science. Teaching Python and Machine Learning (Unsupervised learning).	
Numerical Algorithms Group (NAG)	11/2015 - 02/2017	Numerical Software Developer	Oxford
		Developer in mathematical optimization. Development of new solvers for the optimization chapter of the NAG Library. Design and implementation of the new interior-point solver (<code>nag_opt_handle_solve_lp_ipm (e04mtc)</code>) in Matlab and Fortran 90. Technical support and consultancy services in Finance. Development of technical reports.	
Moody's Investors Service	06/2013 - 05/2014	Associate	Frankfurt
		Developer in Excel VBA/SQL/C#, SFG Technology team. Credit risk modelling, development of VBA tools for CMBS and RMBS team. Development of new reports and data analysis tools with SQL Server.	
SEAT, S.A.	06/2011 - 05/2013	Several positions	Martorell, Barcelona
		Excel VBA/VB 6.0/Access developer. Development and automation of several internal analytic tools. Development of application to improve reporting tasks.	

COMPUTER SKILLS

Basic	R
Intermediate	C++ and SQL
Advanced	PYTHON and FORTRAN 90
O.S.	Linux, Cygwin, Windows 7/8/10
Optimization	AMPL, GOOGLE OR-TOOLS, CVXPY. Solvers: GUROBI, LOCALSOLVER, NAG.

PROJECTS

1. **OptBinning:** OptBinning is a library written in Python implementing a rigorous and flexible mathematical programming formulation to solving the optimal binning problem for a binary, continuous and multiclass target type. Github (> 8M downloads): <https://github.com/guillermo-navas-palencia/optbinning>. Web: <http://gnpalencia.org/optbinning/>.
2. **CPrior:** Python/C++ library to perform fast Bayesian A/B and multivariate testing. CPrior supports several conjugate prior distributions, implementing many closed-forms in terms of special functions to obtain high performance. Github: <https://github.com/guillermo-navas-palencia/cprior>. Web: <http://gnpalencia.org/cprior/>.
3. **GNSTLIB:** Numerical library written in C++11 for fast and accurate computation of special functions in double precision floating-point arithmetic.

PUBLICATIONS AND TECHNICAL REPORTS

1. G. Navas-Palencia. *Efficient computation of the large homogeneous portfolio approximation with t-copula model*. Submitted, (2023).
2. G. Navas-Palencia. *Optimal Counterfactual Explanations for Scorecard Modeling*. Submitted, (2021).
3. G. Navas-Palencia. *Optimal binning: mathematical programming formulation*. Submitted, (2020).

4. G. Navas-Palencia. *Numerical methods and arbitrary-precision computation of the Lerch transcendent*. Submitted, (2019).
5. G. Navas-Palencia. *High-precision computation of confluent hypergeometric functions via Franklin-Friedman expansion*. *Advances in Computational Mathematics*, volume 44, Issue 3, pp. 841-859, (2018).
6. G. Navas-Palencia. *Fast and accurate algorithm for the generalized exponential integral $E_\nu(x)$ for positive real order*. *Numerical Algorithms*, volume 77, Issue 2, pp. 603-630, (2018).
7. G. Navas-Palencia, A. Arratia. *On the computation of confluent hypergeometric functions for large imaginary part of the parameters b and z* . *Springer Lectures Notes in Computer Science (LNCS)*, volume 9725, pp. 241-248, (2016).
8. G. Navas-Palencia. *NAG Technical report - Extending Error Function and related functions to Complex Arguments*. (2016).
9. G. Navas-Palencia. *NAG Technical report - Index-tracking portfolio optimisation model*. (2016).
10. G. Navas-Palencia. *NAG Technical report - Portfolio Credit Risk: Introduction*. (2016).

CONFERENCES, WORKSHOPS AND SEMINARS

1. **BBVA AI Factory - The Discussion Club**, 24th January 2023. Madrid, Spain. Talk: "*OptBinning: The Python optimal binning library*".
2. **PyDay BCN 2022**, 26th November 2022. Barcelona, Spain. Talk: "*Optimal binning using Python*".
3. **31st European Conference on Operational Research**, 11 - 14 July 2021. University of West Attica, Athens, Greece. Talk: "*Mathematical optimization for scoring modelling*".
4. **PyDay BCN 2019**, 16th November 2019. Universitat de Barcelona, Barcelona, Spain. Talk: "*Fast Bayesian A/B and multivariate testing*".
5. **FOCM 2017 - Foundations of Computational Mathematics**, 10 - 19 July 2017. Universitat de Barcelona, Barcelona, Spain. Poster: "*Fast and accurate algorithm for the generalized exponential integral $E_\nu(x)$ for positive real order*".
6. **Barcelona Mathematical Days 2017**, 27 - 28 April 2017. Institut d'Estudis Catalans, Barcelona, Spain.
7. **InFoMM Optimisation Research Sandpit**, 21th September 2016. Mathematical Institute, University of Oxford, United Kingdom.
8. **5th International Congress on Mathematical Software**, 11-14 July 2016. Zuse Institute Berlin (ZIB), Germany. Talk: "*On the computation of confluent hypergeometric function for large imaginary part of the parameters b and z* ".
9. **Global Derivatives Trading & Risk Management**, 9 - 13 May 2016. Budapest, Hungary.
10. **Seminar UPC-UAB of Computational Finance**, 20th January 2016. Invited speaker: "*Portfolio Credit Risk: models and numerical methods*". Universitat Politècnica de Catalunya, Spain.
11. **Bath/RAL Numerical Analysis Day**, 11th January 2016. Rutherford Appleton Laboratory, Oxford, United Kingdom.
12. **Barcelona Insurance and Risk Management Summer School**, July 2015. University of Barcelona, Spain.

13. **Interdisciplinary Workshop on Quantitative Finance**, June 2015. Centre de Recerca Matemàtica, Spain.
14. **IREA seminar Riskcenter**, March 2015. University of Barcelona, Spain.
15. **Barcelona Mathematical Days 2014**, 7 - 8 November 2014. Institut d'Estudis Catalans, Barcelona, Spain.

AWARDS

Finalist First Global Data Edition 2019 BBVA. Data Challenge Perú, Dec. 2019.
Doctoral thesis Excellent Cum Laude, Oct. 2019.

ACADEMIC SERVICE

- Conferences:
 - **EuroPython 2022**. Reviewer (3 tracks).
 - **International Congress on Mathematical Software (ICMS) 2024**. Reviewer for session *Numerical software for special functions*.
- Journal Reviewing:
 - ACM Transactions on Mathematical Software.

ORGANIZATIONS

- Association for Computing Machinery (ACM). Professional member.

OTHER INFORMATION

Teaching 2005 - 2012 · Tutor of math for high school students and college freshman.
Courses Coursera: Machine Learning (Stanford), 2014 · GPA: 100%.

Languages Fluent in English, Spanish and Catalan. Elementary in German.

Interests Open-source software · Mathematics reading · Running/Kayaking

March 31, 2024