

# Debs Maia Silva

Manager Data Scientist, Capital One

Engineering PhD with focus on Machine Learning and Data Science

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## EDUCATION

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- **Purdue University** West Lafayette, IN  
*Direct Ph.D Purdue College of Engineering, **Ross Fellow***
- **Campinas University (UNICAMP)** Campinas, Brazil  
*Bachelor of Civil Eng., Specialization in Energy Resources; Minor in Computer Eng.*

## WORK EXPERIENCE

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- **Capital One** McLean, VA  
*Manager - Data Science* 07-2025 – Present
  - **Risk Management - AI Applications:** Tech Lead for a cross-functional team developing and deploying **AI-driven solutions** in the Risk Management domain. Model Developer for the **Program Views Project**, an enterprise-scale platform that generates actionable insights from unstructured and structured data using **vector databases, retrieval-augmented generation (RAG), and generative AI pipelines**. Reduced review time by up to 80% while delivering scalable **LLM-powered architectures** integrated into business-critical decision-making. Directed collaboration across data science, engineering, and risk teams to align AI solutions with compliance needs.
- **Capital One** McLean, VA  
*Principal Associate - Data Science* 06-2021 – 07-2025
  - **Risk Management - AI Applications:** Pioneered Capital One's first production-grade **LLM application** in a regulated environment, shaping internal controls for regularization and guardrails. Designed and deployed pipelines for **summarization, RAG-based search, and automated evaluation** of compliance materials, including the **Enforcement Actions Summarization and Evaluation System**.
  - **Retail Bank Operations - NLP and ML:** Developed and maintained **NLP and deep learning models** to detect regulatory failures in call center operations. Improved detection accuracy by 40% and reduced analyst review time by 50%, directly enhancing compliance monitoring and informing agent training programs.
  - **Retail Bank - Fraud ML:** Development of an in-house **fraud detection model** for debit transactions, replacing vendor systems. Supported key stages of the ML lifecycle — **feature engineering, model training/validation, deployment, and stakeholder delivery** — leveraging **Python, Spark, AWS, and PyTorch**.
- **Capital One** McLean, VA  
*Ph.D Data Science Intern* 06-2020 – 08-2020
  - **Graph-Based Fraud Analytics:** Applied **graph algorithms and network embeddings** to uncover hidden relationships in transaction data, improving fraud detection models by identifying fraudulent clusters and high-risk nodes.
- **Purdue University** West Lafayette, IN  
*Graduate Research Assistant, Advisor: Prof. Roshanak Nateghi* 08-2017 – 05-2021
  - **Applied Machine Learning for Energy Forecasting:** Developed **Bayesian additive regression trees, neural networks, and ensemble models** for climate and energy datasets, demonstrating the critical role of humidity in energy demand forecasting. Published findings as first author in *Nature Communications*.
  - **Predictive Modeling:** Built and validated models in **Python and R** to forecast energy consumption during extreme weather, capturing both average trends and **asymmetric tail risks** crucial for outage preparedness.
  - **Hybrid Modeling Approaches:** Enhanced predictive accuracy by combining **quantile regression, tree-based methods, and neural networks**. Research contributed to climate-energy risk analytics and was presented at multiple international conferences.

## PUBLICATIONS (SELECTED)

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- D. Maia-Silva et al. "The Goldilocks Zone in Cooling Demand," *AGU Earth's Future*, 2022
- R. Obringer, D. Maia-Silva et al. "The overlooked footprint of Internet use," *Resources, Conservation Recycling*, 2021
- D. Maia-Silva et al. "The role of humidity in electricity demand," *Nature Communications*, 2020
- R. Kumar, D. Maia-Silva et al. "Asymmetrical response of CA electricity demand," *Scientific Reports*, 2020

## TECHNICAL AND LEADERSHIP SKILLS

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- **AI/ML:** Large Language Models (LLMs), Transformer architectures, Retrieval-Augmented Generation (RAG), NLP, Deep Learning, Predictive Modeling, AI Evaluation
- **Programming & Frameworks:** Python, R, SQL, Spark, LangChain, Hugging Face, PyTorch, TensorFlow
- **Data Engineering & Cloud:** AWS, Hadoop, H2O, MLOps deployment pipelines
- **Visualization & Communication:** Tableau, Lucid, Adobe Illustrator, Inkscape
- **Leadership & Mentorship:** Team leadership, cross-functional collaboration, mentorship of Data Scientists, internship mentor and site lead (3 years), coaching for college AI/ML projects
- **Languages:** English (fluent), Portuguese (fluent), Spanish (intermediate)

## CONFERENCE PRESENTATIONS AND PRESS CITATIONS

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- **SECON (2025):** Transforming Compliance with AI.
- **MAC (2023–2025):** Panel on AI evaluation and Automatic Label Creation.
- **Rewriting The Code (2024, 2025):** AI Under the Hood and Tech Career Guide.
- **SHPE (2024–2025):** Career Guide for Women in Tech.
- **SRA (2018–2020):** Talks on electricity demand, humidity modeling, and cooling demand.
- **Water Food Energy Nexus (2018):** Poster on electricity demand analytics.
- **Climate Central (2020):** Hotter Climate, More Cooling Demand.
- **Phys.org (2020):** Climate change and U.S. electricity demand.

## HONORS AND AWARDS

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- SRA EISG Student Merit Award 2020
- **Outstanding Research Award – Purdue College of Engineering** 2020
- **Ross Fellowship – Purdue College of Engineering** 2017–2021
- Excellence in Leadership – UNICAMP Engineering Sports League 2014
- Scientific Initiation Scholarship – FAPESP-PIBIC 2013

## VOLUNTEERING

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- Women in Tech and Latinas in Tech Workshop Presenter and Moderator 2024–2025
- Internship mentor and site lead – Capital One Data Science Program 2022–2025
- Logistics Lead – Capital One Modeling and Analytics Conference (MAC) 2022–2023
- Founder, "Vem ser Dev": Python and data science education for Portuguese speakers  
 @(@python\_direto.ao\_ponto) 2020–Present