Adrian Hernandez-del-Valle

Applied AI & Quantitative Risk Scientist · PhD Economist · Columbia-Trained Statistician

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Professional Summary

Applied AI and quantitative risk scientist with 7+ years of industry experience and a PhD in Economics, building machine learning, generative AI, and econometric systems that turn complex data into decisions. Founder of AI products spanning multi-agent LLM pipelines, retrieval-augmented generation, and climate-data auditing; currently leading geospatial risk modeling for urban heat and flood resilience in Montreal. Author of 25+ peer-reviewed publications. Multilingual professional fluent in English (CELPIP-11), Spanish, and French (TEF-B2).

Technical Skills

- **Machine Learning & AI:** Multi-agent LLM systems (Claude, GPT-4, LangChain), Retrieval-Augmented Generation (ChromaDB, FAISS, BGE embeddings), Transformers, LSTM/GRU, LightGBM, NLP, prompt-injection hardening
- **Econometrics & Statistics:** Causal inference (fixed-effects PPML, difference-in-differences, synthetic control, event studies), conformal prediction (CQR, Mondrian, NexCP), quantile regression, structural break detection (Bai-Perron), GARCH, negative binomial count models
- **Geospatial & Climate Data:** Google Earth Engine (ERA5, LiDAR canopy, Copernicus DEM), spatial interpolation (IDW), ETCCDI climate indices, census-tract panel construction, ECCC/NOAA/Ouranos data pipelines
- **Programming & Tools:** Python (TensorFlow, PyTorch, scikit-learn, pandas, geopandas), SQL, FastAPI, Supabase, Fly.io, AWS, Docker, Git, Google Colab, public data APIs (BLS, FRED, BEA, StatCan)
- **Languages:** Fluent in English, Spanish, and French

Professional Experience

Technology Solutions Consultant (Volunteer) | SCRI (Services Communautaires pour Réfugiés et Immigrants) — *July 2025 – Present*

- Developed AI-powered bilingual content generator to optimize organizational social media presence
- Built AI-driven bilingual web scraper integrating Canadian government open data, automating project classification and Excel exports for a strategic intelligence dashboard
- Developed real-time translation platform integrating Whisper and Claude via microservices architecture (Kafka, gRPC, WebSocket), achieving <1s latency for seamless multilingual transcription
- Designed MindBridge Mentor, a global AI mentorship platform for young STEM immigrants: multi-agent LangChain architecture connecting 1,500 youth to 150 Montreal university mentors

Founder & AI Research Lead | Independent AI Products — *May 2023 – Present (Part-time)*

- **Trutina** — built an AI-powered academic paper review SaaS: five-agent adversarial debate architecture over a ChromaDB/BGE RAG corpus of ~10,500 documents from 102 journals (FastAPI, Fly.io, Supabase); extended it into a research-to-outreach pipeline generating fidelity-audited popular-science articles and video scripts with evidence maps tracing every claim to its source
- **Windrose (windrose.news)** — conducted an independent audit of Environment and Climate Change Canada's precipitation network covering 8,374 stations (23.5% effective failure rate); findings engaged the Environment Minister's office and an MP's office, and the site runs Law 25/PIPEDA-compliant analytics

- **Tariff pass-through replication** — independently reproduced a U.S. Federal Reserve finding on 2025 tariff pass-through to consumer prices using only free public data (BLS, FRED, BEA): significant pass-through slope across ~242 CPI categories with a monotone dose-response gradient, validated against BEA input-output import content (Spearman ρ=0.74) and 177 placebo categories; extended the framework to forecast Canadian industry exposure to Section 338 tariffs
- Published 4 peer-reviewed technical articles on machine learning applications in manufacturing and energy sectors; mentored 35+ data science professionals in advanced ML and LLM implementation

Affiliated Faculty | IPN – Escuela Superior de Economía (Mexico) — *Ongoing (Remote)*

- Currently directing 4 doctoral theses and 1 master's thesis in Economics; teach graduate econometrics online with Colab-based notebooks (GARCH, ARIMA, panel data)
- Author of 25+ peer-reviewed publications in agricultural economics, financial econometrics, and AI/ML applications; active manuscripts under review at Agricultural Finance Review and Journal of Commodity Markets

Founder & Principal Data Scientist | Intelligence Matters — *March 2021 – May 2023*

- Developed and implemented production NLP systems using Python, TensorFlow and PyTorch, improving operational efficiency by 25%
- Engineered custom ML solution with Transformer models and Siamese Neural Networks, automating script-compliance monitoring across all audited call-center calls
- Created anomaly detection algorithms that identified non-compliant call operators, reducing fraud by 35% and generating $450K in annual cost savings
- Built named entity recognition pipeline for PII extraction with 98% accuracy using BERT models and custom NER training
- Led 3 cross-functional teams (15 members) implementing predictive analytics across banking, healthcare, and retail

Senior Data Scientist | ESTA International — *January 2018 – February 2021*

- Spearheaded big data analytics for the Mexican Electricity Wholesale Market (MEM) with 30+ TB of data (Python, SQL, AWS)
- Engineered ML-based anomaly detection algorithms that improved market monitoring accuracy by 42%
- Developed Local Marginal Price (LMP) and demand forecasting models using LSTM and GRU networks, reducing prediction error by 18%
- Authored 14 technical reports for the Energy Regulatory Commission (CRE) that influenced regulatory policy changes
- Managed a team of 36 professionals, optimizing market surveillance efficiency and delivering $2.8M in cost savings

Education

- **MSc in Data Science and Business Analytics** | HEC Montréal, Canada (admitted; starting Winter 2027)
- **PhD in Economics** | School of Economics (ESE-IPN), Mexico
- **Master of Artificial Intelligence** | OBS Business School and Universidad Politécnica de Cataluña, Spain
- **Master of Arts in Statistics** | Columbia University, USA
- **Master of Business Administration** | IPADE Business School, Mexico

Selected Projects & Independent Research

Full portfolio with source code and demos available at adrianhernandezdelvalle.com

- **Trutina:** AI academic paper review platform — five-agent adversarial debate, RAG over 10,500 documents from 102 journals, plus a fidelity-audited research-to-outreach content pipeline (articles and video scripts)

- **Windrose:** Independent audit of Canada's precipitation station network (8,374 stations) with public reporting. windrose.news
- **Tariff Pass-Through Lab:** Independent replication of Fed research on 2025 tariff inflation with fully public data, plus Canadian Section 338 exposure forecasting
- **Math Problem Solver with RAG:** Bilingual RAG system using Claude, LangChain and FAISS, improving response time by 40%. GitHub
- **MMoE-TCAV Financial Forecasting:** Interpretable Multi-Gate Mixture of Experts model achieving 91.4% accuracy in currency decline detection. GitHub