Christian Lezcano

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Machine Learning Engineer | Agentic AI & RAG Systems

Machine Learning Engineer specialized in architecting scalable Agentic AI and Retrieval-Augmented Generation (RAG) systems. I bridge the gap between robust data infrastructure and experimental AI, building production-grade solutions that deliver real-world business value.

Currently developing autonomous workflows while serving as a CS Instructor at Columbia University of Paraguay. My academic interests center on Discrete Optimization and Generative AI, with a specific focus on applying structural constraints to deep learning models.

Work Experience

Machine Learning Engineer at Vitaly Mineral Water *Feb 2025 – Present*

- Engineered a production-grade Autonomous Multi-Agent System using LangGraph and Google Gemini 2.0 to automate Direct-to-Consumer sales and customer support workflows.
- Architected a high-performance RAG pipeline managing inventory data, implementing Hybrid Search with ChromaDB to achieve <100ms retrieval latency.
- Designed safety-critical Human-in-the-Loop workflows, implementing graph interrupts to ensure compliance and prevent hallucination in sensitive operations like refund approvals.
- Optimized vector embedding pipelines using CUDA Hardware Acceleration, reducing data processing time by 90% through GPU parallelization.
- Deployed inference services using FastAPI and Docker on AWS EC2, establishing a CI/CD workflow for rapid agent iteration.

Data Engineer at Vitaly Mineral Water *Sep 2019 – Jan 2025*

- Led the migration of on-premise infrastructure to AWS (S3, RDS, EC2), achieving a 30% reduction in data latency across production facilities.
- Built and orchestrated robust ELT pipelines using Airflow, Python, and PostgreSQL, replacing manual data workflows with fault-tolerant automated scripts.
- Designed and deployed predictive models using scikit-learn for demand forecasting and maintenance scheduling, improving operational efficiency by 20%.
- Implemented CI/CD pipelines via GitHub Actions to streamline code deployment, ensuring high code quality and reducing deployment time by 50%.

Data Analyst at Vitaly Mineral Water *Sep 2016 – Aug 2019*

- Established the company's first automated reporting framework, migrating manual Excel workflows to automated SQL pipelines.
- Designed interactive Power BI dashboards to visualize Key Performance Indicators (KPIs) for executive decision-making.
- Optimized complex PostgreSQL queries and Power Query logic, significantly improving report accuracy and refresh speeds.

CS Instructor & Thesis Advisor at Columbia University of Paraguay *Jul 2023 – Present*

- Algorithms II: Lead the instruction of advanced data structures, complexity analysis, and the implementation of efficient algorithmic paradigms.
- Information and Communication Technologies (ICT): Deliver the core curriculum focused on modern ICT systems, tools, and their practical industry applications.

Data Research Analyst at Columbia University of Paraguay *Oct 2023 – Oct 2024*

- Led a research-driven initiative to define and track Key Performance Indicators (KPIs) for the Computer Science program. Developed a comprehensive analytical framework to monitor student enrollment, retention, and graduation rates, delivering data-driven insights to university leadership to optimize academic efficiency.

Senior Software Developer at Emtausa Co., Paraguay *Jan 2010 – Aug 2016*

- Led the design and implementation of large-scale enterprise applications using Java (J2EE/Java EE), focusing on robust back-end logic and EJB (Enterprise JavaBeans) for complex business processes.
- Developed dynamic web interfaces using JSF (JavaServer Faces) and PrimeFaces, integrating them with Hibernate/JPA for efficient ORM (Object-Relational Mapping) and database persistence.
- Architected and optimized complex relational schemas in PostgreSQL and SQL Server, ensuring data integrity and high-performance query execution for mission-critical systems.
- Designed and consumed SOAP and RESTful Web Services to facilitate communication between legacy on-premise systems and modern web-based modules.
- Maintained and modernized critical business modules developed in C# .NET and Delphi, ensuring a seamless transition to web-based environments.
- Acted as a technical lead, implementing early Agile/Scrum methodologies to streamline development cycles and mentor junior developers in clean code practices.

Education

Anyone AI
Specialization in Machine Learning Engineering 2025

National University of Asuncion 2012
M.S., Computer Science (Master en Ciencias de la Computación)

National University of Asuncion 2008
B.S., Computer Science Engineering (Ingeniero en Informática)

Publications

- Lezcano, C. and Arias, M. (2019b), "Synthetic dataset generation with itemset-based generative models", in Proceedings of the 4th Workshop on Reliability and Security Data Analysis co-located with IEEE International Symposium on Software Reliability Engineering (ISSRE 2019), Berlin, Germany, October 28th, 2019., pp. 288-293.
  [pdf] [slide] [bibtex]

- Lezcano, C. and Arias, M. (2019a), "Characterizing transactional databases for frequent itemset mining", in Proceedings of the 1st Workshop on Evaluation and Experimental Design in Data Mining and Machine Learning co-located with SIAM International Conference on Data Mining (SDM 2019), Calgary, Alberta, Canada, May 4th, 2019., pp. 44-53.
  [pdf] [video] [bibtex]

- Colbes, J. D., Corona, R. I., Lezcano, C., Rodriguez, D. O. and Brizuela, C. A. (2017), "Protein side-chain packing problem: is there still room for improvement?", Briefings in Bioinformatics 18(6), 1033-1043.
  [pdf] [bibtex]

- Brizuela, C. A., Corona, R. I., Lezcano, C., Rodriguez, D. O. and Colbes, J. D. (2015), "An experimental analysis of the performance of sidechain packing algorithms", in Genetic and Evolutionary Computation Conference, GECCO 2015, Madrid, Spain, July 11-15, 2015, Companion Material Proceedings, pp. 929-933.
  [pdf] [bibtex]

- Lezcano, C., Pinto, D. and Baran, B. (2008), "Team algorithms based on ant colony optimization - A new multi-objective optimization approach", in Parallel Problem Solving from Nature - PPSN X, 10th International Conference Dortmund, Germany, September 13-17, 2008, Proceedings, pp. 773-783.
  [pdf] [bibtex]

Skills

- AI & Agents: Agentic AI, LangGraph, RAG, PyTorch, Geometric Deep Learning, OpenAI API, Google Gemini, Hugging Face.
- Cloud & MLOps: AWS (EC2, S3, RDS), Docker, FastAPI, GitHub Actions, Linux (WSL2/CUDA), MLflow.
- Data Engineering: Python, Advanced SQL, PostgreSQL, Apache Airflow, Vector Databases (ChromaDB, FAISS).