ESTEBAN MARULANDA A.

Python developer

+57 321 6556175 esteban-marulanda-ardila estebma@gmail.com Sao Paulo, Brazil

Data Scientist and Physicist with strong computational modeling skills and 2.5+ years delivering applied ML: anomaly detection, NLP classification, and data-quality monitoring, from ingestion to deployment.

RELEVANT EXPERIENCE

Synaptica

08/2023-12/2025 Remoto

- Built and productionized a statistical anomaly detection system for bank accounts, integrated into a Streamlit platform; automated ingestion → feature engineering → scoring → alert generation with backtesting, threshold tuning, and monitoring.
- Developed a resilient web data extraction pipeline using Python + Selenium, implementing session management, rate limiting, retries, and validation; handled access challenges via a compliant captcha-handling workflow and robust fallbacks to ensure stable data delivery.
- Fine-tuned Transformer-based NLP classifiers in PyTorch to map free-text descriptions into predefined labels; built the full training/evaluation loop (splits, metrics, error analysis) and packaged inference for integration into downstream automation.
- Developed a Python data-quality monitoring application (PyQt) with CI/CD practices in Azure DevOps, running automated integrity checks (schema drift, missingness, duplicates, outliers) and triggering actionable anomaly alerts with traceable logs.
- Delivered an end-to-end ML pipeline and Streamlit app for construction budgets: ingestion and normalization, feature generation, area-based model training, engineering rule application, and automated quantity prediction with versioned outputs.
- Automated standardization of construction budgets from heterogeneous Excel/Word templates into analytics-ready datasets using robust parsing, normalization rules, and validation checks; enabled consistent downstream reporting and model training.
- Created a reusable Cookiecutter ETL template in Python to standardize new data pipelines (config-driven structure, logging, testing hooks, and consistent project layout), accelerating delivery and improving maintainability across projects.

Guane Enterprises

12/2022 – 02/2023 Remote

- Developed a stochastic optimization model for demand management using Python and Pyomo, integrating advanced mathematical modeling techniques.
- Implemented and validated optimization algorithms in Python with Pyomo, Pandas, and NumPy to enhance decision-making processes in demand management.

Research in Computational and Experimental Physics

View simulations on GitHub

2021 – Present Medellín, Colombia

- Created Python programs for various simulations of physical systems.

PUBLISHED PAPERS

2025 — Windowing in terahertz time-domain spectroscopy: resolving resonances in thin-film samples. *Journal of Infrared, Millimeter, and Terahertz Waves* (Vol. 46, Art. 75).

2025 — Generalized finite differences method applied to finite photonic crystal. *Journal of Modern Optics* (Vol. 72, Issue 13–15).

2024 — Switchable dual-band generation of femtosecond pulses in a mode-locked Erbium-doped fiber laser based on monolayer graphene. *Journal of Lightwave Technology* 42(23), 8405–8413.

2023 — Correspondence Between the Energy Equipartition Theorem in Classical Mechanics and its Phase-Space Formulation in Quantum Mechanics. *Entropy* 25(6), 939.

PREPRINTS

2023 — Influence of Initial Entangled States on the Temperature-Dependent CHSH Inequality. *arXiv* (quant-ph), arXiv:2309.07455.

2023 — Experimental parameters' uncertainty limits for z-scan and f-scan techniques. *arXiv*, arXiv:2305.09514.

EDUCATION

B.Sc. in Physics

University of Antioquia • GPA: 4.48/5.0

2017 – 2023 | Medellín, Colombia

- **Focus:** Computational modeling, data analysis, and scientific programming (Python/C++).

M.Sc. in Physics

University of São Paulo • GPA: 4.00/4.00

2024 – Present | São Paulo, Brazil

- **Focus:** Optimized Python workflows for parameter extraction in quantum-material experiments (signal processing, fitting, reproducible pipelines).

Selected coursework (programming & data)

- **Data Engineering:** ETL fundamentals, PostgreSQL, AWS basics (IAM/roles), Docker, Git/GitHub, Scrum.
- **Scientific Computing:** Computational Physics I–II (Python/C++), Computational Statistical Physics (networks & NN fundamentals).
- **Computer Vision / Numerical Tools:** Fourier Optics and Optical Information Processing (OpenCV, NumPy, Matplotlib).
- **Quantum Computing:** The Coding School (Python).

HARD SKILLS

Python | TensorFlow | Transformers | OOP | PEP8 Compliance | PyTorch | Git (GitHub, GitLab) | C/C++ | Pandas | NumPy | SciPy | LaTeX | Statistical Analysis | ETL Processes | Data Management

SOFT SKILLS

Hard-working | Fast-learner | creative | High stress tolerance | Good communication

AWARDS

Award for distinction in research.

Click to see information

11.2023 | Medellin, Colombia

The Medellín Investiga Awards honor the city's researchers' dedication, commitment, and passion

Bachelor's thesis: honorable mention

Experimental parameters' Uncertainty limits for z-scan and f-scan techniques

03.07.2023 | Medellin

Contest: National mathematics olympiad

Universidad Nacional - Click to see certification

08.2019 | Medellin, Colombia

Bronze medal

LANGUAGES

Spanish — Native
English — Advanced
Portuguese — Intermediate
German — Elementary

Programming Languages

Python
C++

REFERENCES

Andrés Felipe Cano (Head of Analytics Department, Bancolombia)
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