Carlos Manuel Martínez Vázquez

Computer Science Student @ Monterrey Institute of Technology

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SUMMARY

Computer Science student at Monterrey Institute of Technology with a strong foundation in statistics, optimization, and algorithmic modeling. Interested in quantitative research, statistical learning, and computational methods applied to financial markets and environmental systems. Skilled in full-stack and ML-based data infrastructure.

EDUCATION

Tecnológico de Monterrey Querétaro, México
B.S. in Computer Science and Technology (GPA: 3.7/4.0) *Aug 2023 – June 2027*
Honors: Academic Excellence Scholarship

EXPERIENCE

Research Software Developer Feb 2025 – May 2025
Instituto Via Diseño *Querétaro, México*
Designed and implemented a relational database in PostgreSQL to model professors, classrooms, and student constraints for automated schedule generation.

Developed a scheduling algorithm based on constraint satisfaction and backtracking heuristics to minimize class conflicts and optimize time-slot allocation.

Optimized SQL queries and indexing strategies, improving data retrieval speed by 40% during constraint evaluation.

Integrated algorithmic results into a full-stack visualization platform using Node.js, React, and TypeScript, enabling real-time edits and analytics for 150+ users.

RESEARCH PROJECTS

Hybrid Asset Pricing: LLM Sentiment & Bi-LSTM | *Working Paper* Dec 2025 – Present
Authoring a research paper comparing lexicon-based models (VADER) vs. LLM-driven sentiment analysis in high-volatility markets.

Developing a hybrid architecture utilizing a Multilayer Perceptron (MLP) to filter stochastic noise and isolate high-fidelity alpha signals.

Integrated Bitso API for automated trade execution under dynamic risk-adjusted thresholds and capital constraints.

AquaHub: Predictive Drought Modeling & Crowdsourcing Feb 2026
Engineered a predictive ML model for drought detection in CDMX, processing 960+ training samples to identify water scarcity hotspots.

Validated a 5-day sliding window architecture, achieving 70–85% accuracy in preliminary drought event detection.

Designed a validation pipeline to cross-reference crowdsourced reports against meteorological norms, covering a demographic of 17.7M residents.

Bloomly: Global Bloom Detection System Oct 2025
Engineered a LightGBM-based predictive model leveraging multi-spectral satellite and meteorological data (GEE, NASA POWER).

Conducted feature selection and dimensionality reduction across 44 ecological indicators to improve classification precision.

Evaluated model performance via AUC and F1 metrics under temporal cross-validation for predictive stability.

Deployed Flask APIs with interactive 3D data visualization (Three.js) for spatial analysis of global bloom patterns.

TECHNICAL SKILLS

Languages & Quant: Python, C++, R, SQL, JavaScript, scikit-learn, LightGBM, pandas, NumPy, Mesa
Dev & Cloud: React, Next.js, Node.js, Flask, PostgreSQL, AWS, Git **Spoken**: Spanish (Native), English (C1)

RESEARCH INTERESTS

Quantitative modeling, financial econometrics, time-series forecasting, portfolio optimization, and multi-agent simulation of market dynamics.