JUAN DAVID VARGAS MAZUERA

Phone:** +1 (438) 529 8750* ***Website: https://juandavidvargas19.github.io/

Mailing address: 1-34 Sherbrooke Est, Montréal, QC, CA. H2X 1C2. ***Email:*** juan.david.vargas.mazuera@umontreal.ca

Proactive **electronic engineer and computer scientist**, with a strong foundation in math, AI, and fintech. I have a multifaceted experience: working as a researcher designing AI architectures for prosocial settings, managing business systems **in the leading credit bureau in Colombia**, and working in independent fintech projects. I like to work in multi-skilled teams that allow me to **learn from my peers and stimulate my ideas.** This comes as I aspire to contribute to **projects' growth & sustainability**, and to **improve customer perceived value.**

1) **Key technical skills:**
   - ✓ **AI expertise, and financial modeling:** 3 years of experience with **clustering**, **time-series, regression models, and deep learning** that led to an accepted paper in a AAAI workshop (**top 15% of accepted papers)** and a submitted article to RLC. I am also a co-author in a tutorial for the **Neuromatch course** (2024). Additionally, I developed fintech products, including a **financial advisor chatbot (presented in the demo day at Mila Quebec AI Institute)**, and an **automated portfolio optimizer** for the **S&P 500**.
   - ✓ **Python and SQL:** 7 years of combined professional/educational experience using python, and relevant libraries (PyTorch, NumPy, Pandas). Additionally, **work experience with SQL** in knowledge management **at Bosch** in Germany.
   - ✓ **BI tools:** Proficiency of Splunk and Power BI through online courses and independent practice.
2) **Key soft skills:**
   - ✓ **Problem solving mindset**: Track record spanning from a **first place in national level mathematics Olympiads**, independent fintech projects, and business systems management consulting experience.
   - ✓ **Attention to detail:** Consistently delivering high-quality under pressure, as proved **by resolving critical incidents at Experian.**
   - ✓ **Effective communication:** Demonstrated verbal communication success in multi-disciplinary teams solving systems automation problems at Experian, and effective written communication demonstrated in my article acceptance at AI conferences (AAAI 2025). On the other hand, I have full working proficiency in **Spanish, English, and German**, and an intermediate level of **French**.

WORK EXPERIENCE

CHUSJ Research Center (PPSP laboratory) — **Montréal, Canada**

Neuro AI Researcher — *September 2023-Present*

- The PPSP laboratory tackles social cognition problems, focusing **on translating insights of basic social neuroscience into AI**. We focus on simulations that reflect the broad social spectrum of humans, especially dilemmas that involve both cooperation and competition. In this regard, my focal research and simulations are key to **understanding how cognitive models, modular attention and metacognition, can promote better/more cooperative AI models**. This was divided into 2 projects: 1) **AI inspired by metacognition** (supervised by Dr. Guillaume Dumas), and 2) **modular attention for competitive/cooperative multi-agent reinforcement learning** (supervised by Dr. Zahra Sheikhbahaee). This research has led to academic participations (refer to next page).

Research Assistant — *June 2024 - August 2024*

- I was in charge to collect and analyze all relevant data to write the **computational resources grant for the digital research alliance of Canada (DRAC)**, thus I communicated to identify and measure the computational needs of 25 team members. I took care of the design, measurements, analysis, and writing. This effort ultimately resulted in our RGU allocation being **increased from 1 to 65 RGU years**, which is closely **equivalent to a market value of CAD $220,000** using the metrics of **H100 80 GB GPUS** of DRAC.

Procedata Internacional (Experian Colombia) — **Bogotá, Colombia**

BSM consultant — *December 2022- August 2023*

- Experian Colombia is the leading credit bureau in Colombia. I worked managing a key business system (control-M). I also **worked closely with both internal and external stakeholders,** Bancolombia and BBVA bank among others, to **automate new business workflows and identify areas for improvement to enhance efficiency and productivity.** These tasks contributed to the continued availability and update of inter-connected workflows both internally in Experian and between Experian and other stakeholders in Colombia (mostly banks). I also worked on keeping up to date control-M in all servers with industry standards, thus, I patched over 80% of vulnerabilities. On the other hand, I was part of the team that answered critical incidents at any time (24/7). I **resolved 100% of my assigned critical incidents** threatening credit data availability for Colombian institutions in under 2 hours on average.

Robert Bosch GmbH — **Schwieberdingen, Germany**

Intern (Semi-autonomous driving division) — *April 2021 - August 2021*

- Robert Bosch GmbH, a global leader in engineering and mobility solutions. I supported a project to **enable automatic camera composition design given customer needs using machine learning** (1-click camera)**.** More specifically, I focus on developing a centralized, SQL-based graph, which resulted in a 40%+ enlargement of the associated relational neural network on ANZO. On the other hand, I worked both developing a centralized site for internal knowledge storage and sharing, as well as collected a 5000+ data points machine-learning readable database for the project. This performance was translated into **a 100% mark for my internship**.

Teaching Experience

- *Private tutor in math, calculus, programming, statistics, and financial engineering – (January 2018 to July 2020)* — ***Cali, Colombia***
- *Teaching assistant in introduction to programming – (August 2019 to December 2019)* — ***Javeriana University, Cali, Colombia***
- *Teaching assistant in calculus 1 – (August 2018 to December 2018)* — ***Javeriana University, Cali, Colombia***

INDEPENDENT PROJECTS

- **Hybrid AI Financial Advisor Chatbot***:* Hybrid chatbot that uses financial modeling to transform economic and deep learning generated predictions into insights for investing and **optimizing a consumer's financial portfolio (investments, savings, spending, and debt)** according to **risk profile**. The first version of this powers the insights with generative AI, while a second version includes automated text answers that compile deep learning predictions using fixed financial formulas to interpret results. This work was carried out in collaboration with Dr. Nima Akbarzadeh, presented in a demo day in pitch format at Mila, and was **awarded CAD $10,000**.

- **Automated Portfolio Optimizer:** Automated tool to **balance an S & P 500 portfolio**. It uses live **data from yahoo finance, Nasdaq data link, and rapid API**. It calculates **a discount value** based on several **historical metrics: book value, earnings, debt, PER**, among others. This **narrows down investment options** in fundamentals as well as **in relation to competitors in the same sector.**

- **AI models for trading:** Implementation of Machine Learning Models for Predicting Short-Term Movements of DJIA Stocks During Quarterly Financial Reporting Periods. Some models used: Random Forest, Decision tree, KNN, LightGBM, SVC, Logistic regression classifier, and Multilayer perceptron (MLP). The decisions were based on current and historical reporting data from EDGAR.

EDUCATION

Université de Montréal (UdeM) – Mila Québec AI Institute Program **Montréal, Canada**
MSc, Computer Science, major in **Artificial Intelligence**, April 2025. GPA 85%. *2023-2025*
- ***Awards:*** Excellence scholarship, Redaction grant, AI scholarship, 2 DIRO fellowships, Research stipend, and Exemption scholarship (DIRO, joint value **CAD $70,000**); Travel grant (Mila); Travel grant (UNIQUE); Colfuturo scholarship (Colfuturo, value **CAD $75,000**).

Otto-von-Guericke-Universität Magdeburg **Magdeburg, Germany**
- 2-year scholarship by **KOSPIE** (DAAD, value **CAD $40,000**) for 50 engineering students in Colombia to do:1) A 1-year German course in Colombia, 2) A 2-month intensive German course (B2) in Germany, 3) an academic semester in a German university (GPA 90%), and 4) an internship semester in Germany. 2020-2021

Javeriana University **Cali, Colombia**
BSc, Electronics Engineering, double minor in **Mechatronics and Telecommunications**, December 2022. GPA 86%. *2017-2022*
- ***Mathematics Olympiads:*** I had various participations in math Olympiads for 7 years. This resulted in national and state awards. For instance, I was **first place** in the 2017 ORM that has nationwide participation, as well as I got to the top 10 in a national track to strive for 6 available places for the international math Olympiads (IMO), which got me to participate in an intensive 1-month boot camp.
- ***Awards:*** Honor mention regional math competition (2022, OMUS); **1st place national mathematics competition (2017, ORM)**; Half tuition scholarship (2017-2021, Javeriana); Selected for 1-month national math boot camp (2017, OCM).

ACADEMIC WORK

- 2025 – ***Reinforcement Learning Conference (RLC) 2025 Main Track:*** "MAPS - A Metacognitive Architecture for Improved Learning: from simple tasks to multi-agent reinforcement learning" (1st Author, preprint). **Edmonton, Canada**
  - ✓ Overview/Repository: https://github.com/juandavidvargas19/MAPS_PROJECT

- 2025 – ***Reinforcement Learning Conference (RLC) 2025 Main Track:*** "MAPLE: Modular Attention for Interpretable and Prosocial Multi-Agent Reinforcement Learning" (Co-author, preprint). **Edmonton, Canada**
  - ✓ Overview: https://drive.google.com/file/d/1aEcKU-kzjo8WxM_sjoJr9HGxAzQRVw4g/view?usp=sharing

- March 2025 – ***AAAI 2025 conference ToM4AI Workshop:*** "MAPS - A Metacognitive Architecture for Improved Social Learning" (1st Author, presented as spotlight paper in a short presentation / selected as top 15% of accepted papers). **Philadelphia, USA**
  - ✓ Overview: https://drive.google.com/file/d/1bQgoUa9TBQBz4KLuhfqV1JS54oN98GOB/view?usp=sharing

- July 2024 – ***Neuromatch NeuroAI Course:*** Interactive code and content co-author for the High Order assessment and metacognition tutorial (CIFAR, NYU, Carnergie Mellon, NSF). **Beaverton, USA**
  - ✓ Overview: https://neuroai.neuromatch.io/tutorials/W2D5_Mysteries/student/W2D5_Tutorial1.html

- May 2024 – ***Canadian AI conference 2024 Responsible AI track:*** "Metacognitive architecture for Perceptual and Social Systems (MAPSS): A Neuro-inspired Metacognition Approach" (1st Author, Presented in the poster session). **Guelph, Canada**

- December 2023 – ***NeurIPS 2023 – Meltingpot Challenge Workshop:*** "A Social Neuro-AI approach to Multi-Agent Reinforcement Learning" (Co-Author, Presented as spotlight paper in short presentation format). **New Orleans, USA**

- October 2023 – ***Workshop of Advances in Neuro AI 2023*:** "Modular Attention in Multi-agent PPO: from the attention schema theory" (Co-Author, Presented as spotlight paper in short presentation format). **Montreal, Canada**

ADDITIONAL INFORMATION

Languages: Spanish (fluent, native); English (fluent, C2/TOEFL); German (advanced, B2/TestDaF); French (intermediate-advanced, B1).

Other skills: Python; C; MATLAB; SQL; Power BI; Splunk; AutoCAD; Circuits design; PSpice; Arduino; Micro-controllers; Anzo; LabVIEW; Proteus; R; Java; Shell Script; SolidWorks; Latex; Git; Advanced Excel; Docker; Linux; Kubernetes.

Diplomas and certificates: Trustworthy and Responsible AI certificate; ML certificate; Mathematics for machine learning certificate; Deploying AI & ML models in production using Microsoft Azure certificate; Fintech: foundations and applications of fintech certificate; Colombian Stock Exchange stock market diploma; fundamental analysis certificate.

Hobbies: Chess; Basketball; Bridge (card game).

EXTRACURRICULAR AND VOLUNTEER ACTIVITIES

CEFAMM Migrants center volunteer: Helped 50+ people navigate their study goals, 5+ scholarships achieved.
Quito, Ecuador

Science teacher volunteer at Serart: Teaching through science experiments, and implementation of Montessori method.
Guadalajara, México

UdeM Latino community ambassador assisting new students.
Montréal, Canada

Reviewer, ATTRIB workshop, NeurIPS 2024.
Vancouver, Canada.

Invited debater at Canadian AI 2024, AI Ethical/Social risks.
Guelph, Canada

Participant in Berkshire Hathaway Shareholders meeting.
Omaha, USA

Debater, documentary – AI Ethical/Social risks.
Montréal, Canada