

Iván Jaen Márquez

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EDUCATION

University of Wisconsin – Madison

Ph.D in Computer Sciences. Research focus: Machine Learning.

Madison, WI, United States

Aug 2022 – Ongoing

Centro de Investigacion en Matematicas, CIMAT

M.S. in Computer Science and Industrial Mathematics

Guanajuato, GTO, Mexico

Jul 2016

Thesis: “A Univariate Boltzmann based Estimation of Distribution Algorithm
Using the Natural Gradient for Updating the Parameters” (in English)

Tecnologico Nacional de Mexico campus Veracruz

B.S. in Computer Systems Engineering

Veracruz, VER, Mexico

Jul 2014

Thesis: “Object Tracking via Particle Filters and Stochastic Algorithms” (in Spanish)

Awarded “Mención honorífica” (Distinction) on final oral defense. Highest GPA in the department’s graduating class.

AWARDS

- Computer Science Summer Research Assistantship, UW-Madison CS Dept. Summer 2023
- Fulbright-Garcia Robles Fellowship for pursuing doctoral studies in the US Aug 2022 – Aug 2025
- Scholarship for Master’s research studies abroad in the UK, Mexican Research Council (CONACYT) Jan – Jul 2015
- Scholarship for Master’s studies in Mexico, Mexican Research Council (CONACYT) Aug 2013 – Jul 2015
- Best undergraduate thesis in Computer Science in Mexico (nationwide annual contest) Oct 2014
Asociacion Nacional de Instituciones de Educacion en Tecnologias de Informacion (ANIEI)

RESEARCH EXPERIENCE

UW-Madison - Independent Studies - Machine Learning and Optimization Group

Madison, WI

Graduate student, advised by Prof. Grigoris Chrystos

Summer 2024

- Worked with modern deep learning architectures (ResNets, CNN, ViT, MoE) analyzing and quantifying inductive biases such as spectral, low-rank embedding and simplicity bias.

UW-Madison - Computer Science Summer Research Assistantship

Madison, WI

Graduate student, advised by Prof. Stephen Wright

Summer 2023

- Worked with block-coordinate descent methods for tackling the Multi-Task/Multi-modal Non-negative Matrix Factorization (NMF) problem. This formulation was applied to cell clustering (RNA-seq, ATAC-seq data).

Robert Gordon University - Computational Intelligence Group

Aberdeen, UK

Visiting Graduate student, advised by Prof. John McCall

Jan – Jul 2015

- Worked with the formal mathematical approach of Estimation of Distribution Algorithms and explored connections with existing state-of-the-art global optimization methods (Covariance Matrix Adaptation, CMA-ES).

CIMAT - Masters Research Thesis

Guanajuato, Mexico

Graduate student, advised by Prof. Arturo Hernandez-Aguirre

Jun – Dec 2014

- Worked with Optimization and Machine Learning methods from the perspective of Information Geometry. Proposed a practical approach by minimizing the KL-divergence of the probability densities w.r.t. the Boltzmann distribution.

CIMAT - Undergraduate Researcher

Guanajuato, Mexico

Undergraduate student

Aug 2012 – Jul 2013

- Worked with the particle filter for target estimation and tracking. Proposed an approach to combine population based meta-heuristics with the particle filter method to improve state estimation for video object tracking.

Mexican Academy of Sciences - National Summer Research Program

Guanajuato, Mexico

Undergraduate student

Jun – Jul 2012

- Attended short courses at CIMAT on Machine Learning, Pattern Recognition, Image processing and Robotics.

RELEVANT CLASS PROJECTS

CS 744: Big Data Systems - Memory Efficient Low-Rank Systems for Large Vision/Language Models

- We explore the utility of multiple low-rank methods for training. We then apply these methods across task domains. Our primary motivation is that this reduces memory cost, as a form of compression.

<https://github.com/ivanjaenm/Low-Rank-training-GaloLTE>

CS 826: Theoretical Foundations of Large-Scale ML - Quantifying modern inductive biases for deep learning.

- I performed 1) a review of simplicity biases, identifying their notions of “simple”, main assumptions and investigating possible relationships. Additionally, 2) experimentally quantify these biases across MLPs under different settings. <https://github.com/ivanjaenm/QuantifyingBiases>

GRADUATE COURSEWORK

• CS/Engineering/Math at UW-Madison:

- Math 521: Analysis I
- ECE 532: Matrix Methods in ML
- CS 784: Foundations of Data Management
- CS 524: Intro to Optimization
- CS 744: Big Data Systems
- ECE 826: Theoretical Foundations of Large-scale ML
- CS 525: Linear Optimization
- CS 760: Machine Learning
- CS 726: Nonlinear Optimization
- CS 839: Foundation Models

TEACHING EXPERIENCE

Lecturer:

UNAM - Faculty of Sciences - Mathematics Dept.

Mexico City

- Genetic Algorithms:

Spring 2018 & Spring 2019

Graduate Teaching Assistant:

CIMAT - Computer Science Dept.

Guanajuato, Mexico

- Algorithms and programming (C++):

Fall 2015

University of Wisconsin–Madison - Computer Sciences Dept.

Madison, USA

- CS 320: Data Science Programming II (Python):

Fall '22, '23, Spring '22, '23

- CS 400: Programming III (Java):

Fall '24

PUBLICATIONS

- **Mario Ivan Jaen-Marquez**, Arturo Hernandez-Aguirre, Rafael Rivera-Lopez, “Object tracking via bio-inspired optimization algorithms” (in Spanish), Talk at *XXIV Escuela Nacional de Optimización y Análisis Numérico*, (ENOAN 2014), Guanajuato, Mexico.
- **Mario Ivan Jaen-Marquez**, Arturo Hernandez-Aguirre, “A parallel numerical integration method based on the Particle Swarm Optimization algorithm” (in Spanish), Talk at *5th. International Supercomputing Conference in Mexico (ISUM 2014)*, Baja California, Mexico.

TECHNICAL SKILLS SUMMARY

- **Programming languages:** C/C++, Python, Julia, Java, Matlab
- **Frameworks/Tools:** PyTorch, Lightning, Docker, PySpark, Scikit-learn, Hydra, Condor/CHTC, Git, Bash, L^AT_EX
- **Languages:** English (Full professional), Native Spanish

WORK EXPERIENCE

Microsoft - Azure

Remote

Data and Applied Scientist

Nov 2020 - Jul 2022

- Applied Statistical Learning and experimentation techniques to get better analytics on Azure products
- Proposed and implemented a k-way merge algorithm to integrate data quality streams from distributed systems.

BBVA bank - Global Markets

Mexico City

Quant Developer

Dec 2015 – Oct 2020

- Productionized a wide range of pricing/risk computational models for the front office trading platform.
- Researched and developed algorithmic trading strategies: optimization for portfolio compression (delta hedging)

SERVICE AND LEADERSHIP

Committee member, Student Chapter of the ACM - UW-Madison

Jan 2023 - Present, Madison, WI

Delta Research Mentor Program

Summer 2023, Madison, WI

Mentor for Incoming CS PhD students at UW-Madison

Fall 2023, Madison, WI

Mentor/Mentee, LatinX in Artificial Intelligence

Sep - Nov 2022, Remote

Fulbright Pre-Academic Program

Summer 2022, Syracuse, NY