Mario Iván Jaen Márquez

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CONTACT INFORMATION

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INTERESTS

Optimization, Machine Learning, Artificial Intelligence (AI), AI applications in image processing/finance

EDUCATION

Centro de Investigacion en Matematicas - CIMAT, Guanajuato, Mexico

Master of Science, in Computer Science and Industrial Mathematics. Aug 2013 – Jul 2015

Thesis: *"A Univariate Boltzmann based Estimation of Distribution Algorithm Using the Natural Gradient for Updating the Parameters"* (in English).
Advisors: Dr. Arturo Hernandez-Aguirre, Dr. John McCall

Relevant coursework: Algorithms and Advanced Programming, Probability and Statistics, Numerical Optimization, Artificial Intelligence, Signal Processing, Statistical Inference, Pattern Recognition

Tecnologico Nacional de Mexico (TecNM) campus Veracruz, Veracruz, Mexico

Bachelor of Engineering, in Computer Engineering. Aug 2008 – Jul 2013

Thesis: *"Object Tracking via Particle Filtering and Stochastic Optimization Algorithms"* (Spanish).
Advisors: Dr. Arturo Hernandez-Aguirre, Dr. Rafael Rivera-Lopez

Awarded "*Mención honorífica*" (Distinction) on final oral defense. Ranked 1st in the department.

Relevant coursework: Artificial Intelligence, Numerical Methods, Simulation, Database fundamentals, Operations Research, Object Oriented Programming, Distributed Computing, Software Engineering

AWARDS

- Fulbright-Garcia Robles fellowship for pursuing doctoral studies in the US beginning in Fall 2022
- Scholarship for academic visit abroad, Mexican Research Council (CONACYT), Jan – Jul 2015
- Scholarship for Master's studies, Mexican Research Council (CONACYT), Aug 2013 – Jul 2015
- Best undergraduate thesis in Computer Science nationwide, *Asociacion Nacional de Instituciones de Educacion en Tecnologias de Informacion* (ANIEI) Mexico, Oct 2014

PUBLICATIONS

Leticia Palos-Sanchez, ***Mario Ivan Jaen-Marquez***, Rafael Rivera-Lopez, "Object oriented modeling for solving the chemical equation balancing problem and its resolution using algebraic methods" (in Spanish), *Programacion Matematica y Software*, Vol. 7, pp. 52-63, 2015.

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.

PROFESSIONAL EXPERIENCE

Microsoft - Azure, Remote

Data & Applied Scientist Jul 2021 – present

- Applying a combination of approaches from the fields of Machine Learning/Optimization/Distributed Computing to gain insights on the quality of Azure communication services from telemetry data.

Software Engineer Nov 2020 – Jul 2021

- Implemented (C#) improvements for billing/monetization microservices in Azure communication

BBVA - Global Markets, Mexico City

Quant Developer Dec 2015 – Oct 2020

- Productionized financial pricing/risk models for the front office trading platform (C/C++, Python)
- Researched and developed algorithms for trading strategies
  - Implemented an optimization algorithm for portfolio compression (delta hedging).

Research Experience

Robert Gordon University - Computational Intelligence Group, Aberdeen, UK

Visiting graduate research student Jan – Jul 2015

- Worked with the formal mathematical approach of Estimation of Distribution Algorithms. Designed an algorithm by employing the Boltzmann distribution and the natural gradient update rule. Explored connections with existing state-of-the-art methods (CMA-ES, NES).
- Resulted in a scalable and competitive global optimization algorithm in terms of function evaluations and minimum value reached compared with similar methods.

CIMAT - Master's Thesis Project, Guanajuato, Mexico

Graduate research student Aug – Dec 2014

- Proposed a continuous optimization algorithm by minimizing the KL divergence of the probability densities w.r.t. the Boltzmann distribution associated with the objective function. Derived analytical expressions for updating the mean and variance parameters using the natural gradient.

CIMAT - Summer Technological Project, Guanajuato, Mexico

Graduate research student Jun – Jul 2014

- Analyzed Information Geometric Optimization and Natural Evolution Strategies. Reformulated the higher expected fitness objective on these algorithms to support different search targets.

CIMAT - Undergraduate Research Thesis Program, Guanajuato, Mexico

Undergraduate research student Aug 2012 – Jul 2013

- Proposed an approach to combine population based metaheuristics with the particle filter method to enhance state estimation in the video object tracking problem. Implemented in MATLAB.
- Presented the results in a national conference in Numerical Analysis/Optimization (*ENOAN 2014*)

Academia Mexicana de Ciencias - National Summer Research Program, Mexico

Undergraduate research student Jun – Jul 2012

- Worked in a proposal for Particle Swarm Optimization involving historical information and parametric extrapolation. Attended short courses on Pattern Recognition, Image processing, Robotics.

TecNM Veracruz - Cuerpo academico de computo intensivo aplicado a la ingenieria

Undergraduate research student Aug – Dec 2011

- Modeled the chemical equation balancing problem using a combinatorial optimization approach, then implemented algebraic methods based on matrix computations using Java.
- Presented the results in a local conference in Optimization and Software (*CICos 2014*)

Teaching Experience

UNAM - Faculty of Sciences - Mathematics department, Mexico City

Adjunct Professor Jan 2018 – Jul 2019

Courses taught:

- Genetic Algorithms, Spring 2018 & Spring 2019 (undergraduate level) ∼15 students enrolled.

CIMAT - Computer Science department, Guanajuato, Mexico

Teaching Assistant Aug – Dec 2015

- Algorithms and programming, Fall 2015 (graduate level course) ∼10 students enrolled.

Skills

Programming Languages: C/C++/C#, Python, Java, R, Matlab

Applications/Tools: PyTorch, PySpark, Git, Bash, Regexp, SQL, KQL, LaTeX

Languages: Spanish (Native), English (Full professional)