Mario Ivan Jaen Marquez

Contact Information	Mexico city, Mexico	(+52) 55 7202 5386
	https://mjaenm.github.io	mario.jaen@cimat.mx

Research Interests

Stochastic Optimization, Evolutionary Computation, Probabilistic Modelling, Machine Learning

Education

Centro de Investigacion en Matematicas - CIMAT, Guanajuato, Mexico

Master of Science, in Computer Science and Industrial Mathematics. Grade: 8.7/10 Dec 2015

Thesis: *A Univariate Boltzmann based Estimation of Distribution Algorithm Using the Natural Gradient for Updating the Parameters (in English).*
Advisors: Dr. Arturo Hernandez, 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 campus Veracruz - TecNM Veracruz, Mexico

Bachelor of Engineering, in Computer Engineering. Grade: 9.5/10 Aug 2008 – Jul 2013

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

Honorable mention 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

Publications & Presentations

Palos-Sanchez, Leticia, *Jaen-Marquez, Mario*, Rivera-Lopez, Rafael, "Modelado Orientado a Objetos del Problema de Balanceo de Ecuaciones Químicas y su Resolucion utilizando Métodos Algebraicos", *Programacion Matematica y Software*, Vol. 7, pp. 52-63, 2015.

Mario Ivan Jaen-Marquez, Arturo Hernandez-Aguirre, Rafael Rivera-Lopez, "Seguimiento de objetos basado en algoritmos de optimización bioinspirados", Talk at *XXIV Escuela Nacional de Optimización y Análisis Numérico, (ENOAN 2014)*, Guanajuato, Mexico.

Mario Ivan Jaen-Marquez, Arturo Hernandez-Aguirre, "Un metodo de integración numerica en paralelo basado en el algoritmo de Particle Swarm Optimization", Talk at *5th. International Supercomputing Conference in Mexico (ISUM 2014)*, Baja California, Mexico.

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. Developed an algorithm by using the Boltzmann distribution and the natural gradient update rule. Explored its connection with existing methods such as: separable CMA-ES and Gaussian UMDA
- Resulted in a scalable and competitive 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 Boltzmman 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.
- Results presented in a national conference in Optimization and Numerical Analysis (*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 OOP in Java to solve it.
- Results presented 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:

- Evolutionary Computation, Spring 2019 (undergraduate level course) 10 students enrolled.
- Evolutionary Computation, Spring 2018 (undergraduate level course) 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.

Professional Experience

Microsoft - Azure

Software Engineer Nov 2020 – present

- Applying a combination of approaches from the fields of API design, Machine Learning, Distributed Computing, Workflow engines, Algorithm Optimization to enable low latency intelligence (i.e translation, sentiment analysis) into Azure Communications (voice/video/chat/telephony) Services.

BBVA - Global Markets, Mexico city

Quantitative Analysis & Development LATAM Dec 2015 – Oct 2020

- Implemented in C/C++/Python, test, deploy mathematical and computational pricing/risk models for the front office trading platform used globally in BBVA
  - Bergomi model for massive stock pair correlation computation using historical prices data.
  - Stochastic Alpha-Beta-Rho (SABR) volatility model for the interest rate Mexican market.
- Research and development for trading strategies
  - Implemented an optimization algorithm for a portfolio compression problem (delta hedging).

Honours & Awards

- Scholarship for academic visit, 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

Skills

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

Applications/Tools: PyTorch, Spark, Git, Bash, Regexp, SQL, LaTeX

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