Juan Pablo Serrano Pérez

My Personal Page | wamjsblvb@live.com.mx | LinkedIn | GitHub

About

Currently I am pursuing a Ph.D. in mathematics. I hold a Master of Science in Mathematics in which I specialized in the design and analysis of algorithms aside discrete mathematics.

Note: This CV is meant to be read digitally. Every blue text (except this one) is clickable. In case you get this CV in physical form, the explicit URLs to visit the webpages are listed at the end.

Education

Ph.D.
Center of Research and Advanced Studies, National Polytechnic Institute, Mexico

Advisors: Dr. Carlos E. Valencia and Dr. Carlos A. Alfaro

M.Sc. Mathematics
Center of Research and Advanced Studies, National Polytechnic Institute, Mexico

Dissertation: Clusters in Optimal Rectilinear Drawings of Complete Graphs: Insights into Potential Recursive Patterns.

Advisor: Ph.D. Ruy Fabila Monroy.

Bachelor of Physics and Mathematics
National Polytechnic Institute, Mexico

Research

Research interests: *My research interests include commutative algebra, machine learning, optimization, algorithms, and statistics.*

Published Articles

1. Carlos A. Alfaro, Teresa I. Hoekstra-Mendoza, Juan Pablo Serrano, Ralihe R. Villagrán, *''Distance ideals of digraphs''*, Applied Mathematics and Computation, 2025, ISSN 0096-3003, https://doi.org/10.1016/j.amc.2025.129430

2. Carlos A. Alfaro, Juan Pablo Serrano, and Ralihe R. Villagrán, *''Evolutive sandpiles''*, Physica A: Statistical Mechanics and its Applications, vol. 657, 2025, article 130248, ISSN 0378-4371, doi.org/10.1016/j.physa.2024.130248.

Preprint Articles

Some of the preprints of the published or non published articles can be found down here.

1. *The characterization of graphs with two trivial distance ideals*, arxiv.org/abs/2504.11706
2. *Distance ideals of digraphs*, arxiv.org/abs/2408.02848
3. *Evolutive sandpiles*, arxiv.org/abs/2404.13137

Talks

1. *Evolutive sandpiles*, XL Coloquio Víctor Neumann-Lara de Teoría de las Gráficas, Combinatoria y sus Aplicaciones

Projects

The following are personal projects that reflect my interests. Most of them are built in Python and are available on my GitHub.

Machine Learning Models

1. Time series forecasting: Development of several models to forecast financial time series. These models include a Recurrent Neural Network with Long Short-Term Memory (LSTM) and hybrid models combining Convolutional Networks and LSTM networks.
2. Sentiment analysis: Language processing for sentiment analysis using an LSTM network.

Clustering Algorithm

Developed a clustering algorithm as part of my master's thesis, exploring an unsupervised learning algorithm to investigate recursion in optimal graph drawings related to the crossing number problem in combinatorial geometry.

Automation and Optimization of Backtesting Strategies

Implemented a Python program that optimizes hyperparameters for various technical indicators, evaluating buy and sell strategies for assets.

Arbitrage in Foreign Exchange Markets

Designed an algorithm to identify real arbitrage opportunities in the Foreign Exchange and Cryptocurrency Markets.

Linear Programming Optimization

Developed a Simplex Algorithm in Python to find optimal solutions to linear programming problems.

Professional Experience

Preparatory Master's Course, 2023
Center of Research and Advanced Studies, National Polytechnic Institute, Mexico

Taught a preparatory master's course in abstract algebra (groups and rings). Proof of this course can be found here.

Microservices Developer, 2021--2023

Enterprise Resource Planning Solutions, Mexico

Developed various types of applications, particularly focusing on REST and JSON as well as SOAP and XML applications. Worked extensively on client-server integration projects, leveraging technologies such as Java, object-oriented programming, OpenShift, and Apache Camel. Additionally, developed OSB (Oracle Service Bus) and SOA (Service-Oriented Architecture) services using Oracle SOA Suite 12c, employing XML, XSD, XSLT, and XQuery to ensure efficient communication and integration between systems. Utilized essential tools like WebLogic Server, Enterprise Manager, and Oracle Service Bus.

Skills

Proficient in Python 3.x and LaTeX. Knowledge of MATLAB, Java, C, SageMath, optimization mathematics, linear and nonlinear optimization. Strong background in probability and statistics, and the analysis and design of algorithms:

- Data structures, graph algorithms, randomized algorithms, parallel computing, approximation algorithms, combinatorial optimization, mathematical optimization, and linear programming.

Knowledge of deep learning:

- TensorFlow, Keras, and scikit-learn; convolutional neural networks, recurrent neural networks, natural language processing, and transformers.

Workshops

Collaborated in the 4th Reunion of Optimization, Mathematics, and Algorithms held in Mexico City.

Languages

Spanish: Native speaker

English: C1 proficiency level

Mandarin: Beginner

Grants

Granted by El Consejo Nacional de Humanidades Ciencia y Tecnología, México. Postgraduate scholarship, grant number #1174526.

Note: If you cannot click the hyperlinks, here are the complete URLs and profile names:

Personal webpage: https://jpabloserrano.github.io

LinkedIn: Juan Pablo Serrano Pérez

GitHub: jpabloserrano