Eric J. Pabón Cancel
Resume

Contact Information

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Education & Academic Background

Ph.D. in Mathematics   June 2029
Purdue University, West Lafayette, Indiana

M.S. in Mathematics   May 2026
Purdue University, West Lafayette, Indiana

B.S. in Pure Mathematics, Minor in Applied Math (*Magna Cum Laude*)   June 2023
University of Puerto Rico, Mayagüez Campus (UPRM), Mayagüez, Puerto Rico

Skills and Other Information
Programming & Computation: Python, Julia, C++, SageMath, MATLAB | Formatting & Tools: HTML, LaTeX, Git
Math & AI/ML: NumPy, SciPy, PyTorch, TensorFlow, JAX, Flux, CUDA | Spoken Languages: English and Spanish

Research Experience

Research Intern in Dynamical Systems and Machine Learning   May 2025–August 2025
URA-Sandia Graduate Student Summer Fellowship & Oak Ridge Institute of Science and Education
Computational & Information Sciences Foundation, Sandia National Laboratories, California Campus
Supervised by: Dr. Moe Khalil, Sandia National Laboratories
Data-Driven Closure Models
- Studied machine learning surrogate models, and learned and applied data assimilation for closure models with JAX.
- Conducted a parametric study of the optimization step for 100 noisy samples of an SIQR epidemic model.
- Determined a minimum ensemble size of 500 ensembles for optimal Ensemble Kalman filter-based data assimilation.

Research Intern in Machine Learning   May 2023–August 2023
MIT Lincoln Laboratory Summer Research Program (GEM Fellowship Employer Sponsor)
Group 39, Division 3, MIT Lincoln Laboratory, Massachusetts Institute of Technology
Supervised by: Dr. Sam Polk & Dr. Mabel Ramírez, MIT Lincoln Laboratory
Unsupervised Behavior Inference from Human Action Sequences (UNBIAS)
- Developed mathematical algorithms for autoencoders with LSTM architecture, using the Flux library.
- Identified the autoencoder that minimized the loss function by using PCA and clustering techniques.
- Used K-medoids to obtain an optimal silhouette score of 0.875, and IF-1 score of 0.839.

Papers and Articles (The asterisk symbol (*) denotes alphabetical order authorship)

[1] S. Polk, <u>E.J. Pabon-Cancel</u>, R. Paleja, K. Chestnut-Chang, R. Jensen and M. Ramírez. Unsupervised Network-Based Behavior Inference from Human Action Sequences (UNBIAS). *2024 IEEE Conference on Games (CoG) 2024, pp. 1-8*.

[2] *D. Chen, P.E. Harris, J. Carlos Martinez Mori, <u>E.J. Pabon-Cancel</u> and G. Sargent. Permutation-Invariant Parking Assortments. *Enumerative Combinatorics and Applications*, **4:1**, 1-25 (2024). #S2R4.

[3] *I. Byrne, N. Dodson, R. Lynch, <u>E.J. Pabon-Cancel</u> and F. Piñero-González. Improving the Minimum Distance Bound of Trace Goppa Codes. *Designs, Codes and Cryptography*. **91**, 2649–2663 (2023).

Projects

Projects in Optimal Transport and Neural Networks   January 2025–May 2025
Purdue University, West Lafayette, Indiana
MA59500MM: Computational Optimal Transport and Deep Generative Models
Instructor: Prof. Rongjie Lai, Purdue University
Normalizing Flow Optimal Transport Implementation on the MNIST Dataset
- Developed a normalizing flow neural network that learned the optimal transport path of a Gaussian-distributed MNIST image to the target MNIST number distribution.
- Generated recognizable digit images upon training completion.

WGAN and Monge Map Implementation on the MNIST Dataset
- Constructed a Wasserstein Generative Adversarial Network with Gradient Penalty (WGAN-GP) and Monge Map Network and applied it to the MNIST dataset.
- Successfully generated realistic-looking sample numbers at the end of training and compared with real samples.