LUIZ MANELLA PEREIRA

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EDUCATION

Florida International University - School of Computing and Information Sciences **Miami, FL**
Major Advisor: Prof. M. Hadi Amini
PhD in Computer Science
Tentative Dissertation Title:
Optimal Transport for Machine Learning: From Federated Learning to Infrastructure Resilience
Tentative Graduation: *May 2025*
GPA: 4.0/4.0

Florida International University **Miami, FL**
Bachelor of Business Administration in Finance | *Bachelor of Science in Applied Mathematics*
Completion: May 2018 | Dec 2020
GPA: 3.87 / 4.0

RESEARCH & FELLOWSHIPS

Publications:

- **Luiz Manella Pereira**, Luis Caicedo Torres, M. Hadi Amini, "Topological Data Analysis for Network Resilience Quantification," Springer Nature Operations Research Forum, Article 29, vol. 2, no. 2, pp.1-17, 2021.
- **Luiz Manella Pereira**, S.S. Iyengar, M. Hadi Amini, "On the Impact of the Embedding Process on Network Resilience Quantification," 2021 IEEE CPS - International Conference on Computational Science and Computational Intelligence
- Ahmed, Khandaker Mamun; Ghareh Mohammadi, Farid; Matus, Manuel; Shenavarmasouleh, Farzan; **Manella Pereira, Luiz**; Ioannis, Zisis; and Amini, M. Hadi "Towards Real-time House Detection in Aerial Imagery Using Faster Region-based Convolutional Neural Network ", IPSI Transactions on Internet Research, vol. 19(2), pp. 46-54, 2023. https://doi.org/10.58245/ipsi.tir.2302.06

Preprint and Under Work:

- Luis Caicedo Torres, **Luiz Manella Pereira**, M. Hadi Amini, "A Survey on Optimal Transport for Machine Learning: Theory and Applications," arXiv, 2021
- **Luiz Manella Pereira,** M. Hadi Amini, “OT-Based Domain Alignment as a Preprocessing Step for Federated Learning”
- **Luiz Manella Pereira,** M. Hadi Amini, “Heterogeneous Federated Reinforcement Learning using Wasserstein Barycenters”

Publication Awards:

- 2021 Operations Research Forum (ORFO) Best Paper Award - “Topological Data Analysis for Network Resilience Quantification”

Solid lab **Miami, FL**
Ph.D. Fellow *May 2020 – Present*

- Led the construction of a survey paper on how optimal transport is being applied in machine learning and what theoretical breakthroughs will allow it to become mainstream and permeate real-life problems
- Contributed to a project that integrated artificial intelligence and machine learning for healthcare which was supported by the Florida Department of Health

FIU - CAESCIR **Miami, FL**
Ph.D. Fellow *May 2020 – August 2022*

- Led research projects that leveraged advanced computing tool to study our nation’s critical infrastructures

- Developed a novel method to quantify network resilience of abstract networks using topological data analysis, optimal transport, and algebraic topology

EXPERIENCE

National Nuclear Security Administration - MSIIP | ORISE **Miami, FL**
Machine Learning Research Intern - Savannah River National Lab *June 3rd 2024 – August 23rd 2024*

- Developed reinforcement learning and control algorithms to optimize movements in robotics
- Optimized hardware/software integration in communication-constrained microcontroller-based robotics
- Developed robotics skills through hands-on work with servos, sensors, wireless communication, and Arduino programming

Algo-nomics LLC **Miami, FL**
Quantitative Researcher and Machine Learning Engineer *June 2018 – March 2024*

- Performed full-stack software engineering roles such as building full-scale finance software using HTML, CSS, JS, Python, Microsoft Azure, Stripe, and Auth0
- Performed quantitative research in the hybrid space of finance, mathematics, statistics, and machine learning
- Constructed and tested optimized portfolios using FML, mathematics/statistics, and portfolio theory
- Improved execution system speeds by ~75% to run mid-frequency strategies that trade in the 0.5-2 second time frame
- Programmed control systems for ultra-realistic simulation and backtesting environments which handle large combinations of algorithms and leverage tick data and level 2 data to embed microstructure models
- Implemented various deep learning pipelines (e.g., LSTM, Transformers) to build novel predictive tools for financial risk management
- Created and implemented a custom Retrieval Augmentation Generation pipeline with LLM for document Q&A with built-in filtration of hallucinated responses

Man Numeric **Boston, MA**
Quantitative Research Intern *May – August 2019*

- Performed quantitative analysis on alpha factors to improve energy sector models and sub-industry models
- Graphically displayed inherent problems to vendor factor data as a result of statistical data analysis using Python
- Researched, categorized, and back-tested ~400 factors as part of an in-sample/out-of-sample research study

CERTIFICATES

- NVIDIA –Fundamental of Deep Learning
- NVIDIA – Generative AI with Diffusion Models
- NVIDIA – Building Transformer-Based Natural Language Processing Applications
- NVIDIA – Building Conversational AI Applications
- NVIDIA – Data Parallelism: How to Train Deep Learning Models on Multiple GPUs
- NVIDIA – Model Parallelism: Building and Deploying Large Neural Networks
- FIU – International Bank Management
- Bloomberg – Bloomberg Market Concepts

SKILLS, ACTIVITIES & INTERESTS

- **Languages:** Fluent in Portuguese and proficient in Spanish
- **Computer:** Microsoft Word, Excel, PowerPoint, Excel VBA, Bloomberg
- **ML/AI:** Tensorflow, Keras, PyTorch, HuggingFace, langchain, Sk-learn
- **Programming:** Python, C++, SQL, MongoDB, Git, Numpy, Pandas, Jupyter Notebooks, RPi
- **Technologies:** CUDA, OpenMP, Azure Cloud and DevOps
- **Web Technologies:** Django, Flask, HTML, CSS, JavaScript, NodeJS, Electron, Express, Stripe, Auth0
- **Interests:** Mathematics, Engineering, Neuroscience, Robotics, Augmented Reality, Autonomous Systems
- **Accomplishment:** Retired World Class International Figure Skater for Brazil