Bruno M. Pacheco

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Research interests

Integer programming, deep learning, graph neural networks, combinatorial optimization

Education

Federal University of Santa Catarina (UFSC) — Florianópolis, SC

M.Sc. in Systems and Automation Eng. — Aug. 2022 – Present
Mentor: Prof. Eduardo Camponogara
GPA: 9.05/10

RWTH Aachen University — Aachen, Germany
Exchange Student, Systems and Automation, M.Sc. — Apr. 2020 – Sep. 2020
GPA: 2.3 (German system)

Federal University of Santa Catarina (UFSC) — Florianópolis, SC
B.Sc. in Control and Automation Eng. — Mar. 2016 – Jul. 2022
Thesis: Physics-Informed Deep Equilibrium Models for Solving ODEs
GPA: 8.73/10

Publications

Graph Neural Networks for the Offline Nanosatellite Task Scheduling Problem
BM Pacheco, LO Seman, CA Rigo, E Camponogara.
Under Review.

Deep-learning-based Early Fixing for Gas-lifted Oil Production Optimization: Supervised and Weakly-supervised Approaches
BM Pacheco, LO Seman, E Camponogara.
SBAI, 2023.

Does pre-training on brain-related tasks results in better deep-learning-based brain age biomarkers?
BM Pacheco, VHR de Oliverira, ABF Antunes, SDS Pedro, D Silva.
BRACIS, 2023.

Towards fully automated deep-learning-based brain tumor segmentation: Is brain extraction still necessary?
BM Pacheco, GS e Cassia, D Silva.
BSPC, 2023.

Automated machine learning for predictive quality in production
J Krauß, BM Pacheco, HM Zang, RH Schmitt.
CIRP, 2020.

Research experience

Student Researcher, Optimization Strategies for Offshore Oil Production - UFSC

Mentor: Prof. Eduardo Camponogara (UFSC) Apr. 2023 – Present

Evaluation of optimization algorithms for oil production optimization in offshore platforms. Mixed-integer-based formulation of the optimization problem, using ReLU and piecewise-linear surrogate models for the nonlinear terms. Deep-learning-based matheuristics for large scale production optimization problems. Research project funded by Petrobras.

Student Researcher, Machine Learning & Applications Research Group (GAMA) - UFSC

Mentor: Prof. Danilo Silva (UFSC) Nov. 2020 – Present

Training of state-of-the-art convolutional neural networks (U-Net) for brain tumor segmentation in multimodal magnetic resonance imaging (MRI). Analysis of brain extraction algorithms as components in the brain tumor segmentation pipeline. Novel transfer learning approach for brain age estimation from MRI, overcoming the state-of-the-art. Proposition of selective prediction technique for image segmentation tasks with a novel uncertainty estimation method (ongoing research).

Student Assistant, Production Quality - Fraunhofer IPT

Mentor: Jonathan Krauß, Ph.D. Apr. 2019 – Sep. 2020

Development of a preprocessing pipeline for large datasets (over 250 GB per dataset) of production data. Development of an anomaly detection algorithm for time series data from an industry partner. Evaluation of automatic machine learning techniques in the context of production quality.

Skills

Machine Learning	PyTorch, JAX, Weights & Biases, Scikit-learn
Optimization	SCIP, Gurobi(py), JuMP
Scientific Computing	Numpy, Pandas, Dask, SQL, Matlab
Programming	Python, Julia, C, Java
Languages	English (fluent/C1), Portuguese (native), Spanish

Teaching experience

Teaching assistant, Department of Systems and Automation (UFSC)

DAS5104: Numerical Calculus Fall 2023

Other professional experience

CERTI Foundation, NEO Empresarial Florianópolis, SC

Engineering intern Sep. 2016 - Feb. 2019

BIX Technology Florianópolis, SC

Summer intern Summer 2019

WEG S.A., R&D Department Jaraguá, SC

Summer intern Summer 2018

Embraco/Whirlpool, Business Opportunities Division Jaraguá, SC

Summer intern Summer 2017