ARTUR BACK DE LUCA

About me

My current work focuses on exploring and improving the reasoning capabilities of neural networks. More specifically, I am interested in the ability of neural networks to simulate algorithms and how such simulations can emerge through training. Understanding these characteristics is crucial for designing models that exhibit a more consistent behavior. Prior to this, I spent more than two years applying machine learning to real-world applications.

Education

Ph.D. in Computer Science **2022 – Present**
University of Waterloo. Supervised by Kimon Fountoulakis GPA: 92/100

M.Sc in Artificial Intelligence and Robotics **2019 – 2022**
Sapienza University of Rome GPA: 98/100 (108/110)

B.Sc in Mechanical Engineering **2013 – 2019**
Federal University of Santa Catarina Overall course ranking: 92nd percentile

Exchange Program **2017 – 2018**
RWTH Aachen University

Research Experience

Huawei *Research Intern* **Feb 2022 – Jan 2023**
Hosted by Guojun Zhang and Yingxue Zhang *Toronto, Canada*

Micromed/CERTI Foundation *Research Consultant* **Feb 2021 – Jan 2022**
Florianopolis, Brazil

Publications

[Preprint 2024] **Back de Luca, A.** & Fountoulakis, K. "Simulation of Graph Algorithms with Looped Transformers" https://arxiv.org/abs/2402.01107

[ICLR 2024] **Back de Luca, A.**, Fountoulakis, K. & Yang, S. "Local Graph Clustering with Noisy Labels" https://openreview.net/forum?id=89A5c6enfc

[Preprint 2022] **Back de Luca, A.**, Zhang G., Chen, X. & Yu, Y. "Mitigating Data Heterogeneity in Federated Learning with Data Augmentation" https://arxiv.org/abs/2206.09979

Awards

DGSA Mathematics Domestic Graduate Student Award **2023**

M-IMAE Mathematics International Master's Award of Excellence Scholarship **2022**

Languages

Programming Python, JavaScript, SQL/NoSQL, Matlab
Spoken & Written Portuguese, English [Native or Fluent], Italian, German [Intermediate].

Projects

Landscapeviz: Python package to visualize the loss landscape of neural networks using TensorFlow

PSOpt: Python package for combinatorial optimization using particle swarms

EEG Sonify: Python project converting EEG data into sound for artifact detection or auditory feedback in Brain-Computer Interfaces.

Teaching

University of Waterloo

Teaching Assistant, CS 338 – Computer Applications in Business: Databases **2024**

Teaching Assistant, CS 245 – Logic and Computation **2022–2023**

Other Professional Experience

NEO Empresarial *Engineering Intern* **May 2015 – Aug 2018**
CERTI Foundation *Data Analytics Intern* **Summers 2017 and 2018**
Fraunhofer Institute for Production Technology *Research Intern* **Apr 2017 – Jan 2018**
Whirlpool – Embraco *Procurement Intern* **Summer 2016**
Numerical Simulation Lab. in Fluid Mechanics and Heat Transfer *Research Intern* **Feb 2015 – May 2015**