Giovanni Pagliarini

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Briefly

I have cultivated the passion for computer science since the age of 5. I have a training as a computer scientist, with a specialization in *Machine Learning* acquired between universities in Italy, Sweden, Singapore and Sydney. Now I am at the end of a PhD, during which I have participated in different research projects, fell in love with Julia, and trained my managerial skills. Recently, I have been considering alternative professional paths to academic research.

Education

PhD in Computer Science and Mathematics

University of Parma, Italy
11/2020 – 01/2024

- Topics: machine learning, formal logic, time series classification, data science, efficient and parallel computing
- My research focused on symbolic learning, and on *interpretable* models for computer vision and temporal reasoning
- I designed and coordinate the development the Sole.jl framework
- I worked on various projects for testing the effectiveness of new machine learning methods: COVID-19 diagnosis from cough/breath sounds; EEG signal interpretation; gas turbine trip prevention; land cover classification from satellite imagery; speech recognition
- I've spent a 3-month period at the *University of Sydney* under the supervision of Prof. Sasha Rubin

Master Degree in Computer Science

University of Gothenburg, Sweden
08/2018 – 06/2020

- ECTS: 120, Grade: G
- Topics: machine learning, computer vision, bioinformatics, discrete optimization, logic, compilers
- Thesis: *Interactionwise – Semantic Awareness for Visual Relationship Detection*
- I enrolled into an student exchange program (6 months), which took me to the *National University of Singapore (NUS)*, where I deepened my knowledge on computer vision

Bachelor Degree in Computer Science

University of Ferrara, Italy
09/2015 – 07/2018

- ECTS: 180, Grade: 110/110 with honors
- Topics: algorithms, computability and complexity theory, parallel computing, computer architecture, operating systems
- Thesis: *Optimization of Lattice Boltzmann simulations for Intel Xeon Phi 'Knights Landing'*

Experience

Research Fellow @ University of Ferrara

Ferrara, Italy
02/2024 – Present

- Associate at the Applied Computational Logic in Artificial Intelligence Laboratory (ACLAI Lab)
- I contribute to the design and development of Artificial Intelligence sistems for several applicative domains
- Manager for 2 computating servers
- I coordinate the construction of Sole.jl, the first framework for symbolic machine learning

Freelance Consultant

Ferrara, Italy
01/2021 – 12/2023

- I am doing consulting, mostly on Artificial Intelligence topics
- I program some web scraping utilities and build datasets for research projects

Machine Learning Developer @ Findwise AB

Gothenburg, Sweden
01/2020 – 06/2020

- I tackled a problem of detection of interactions between objects in digital images (*Visual Relationship Detection*)
- I made extensive use of machine learning techniques for computer vision and natural language processing (NLP)

Teaching Assistant @ University of Ferrara, University of Gothenburg

Ferrara, Italy & Gothenburg, Sweden
01/2020 – 03/2023

- I held excercise sessions, prepared exercise documents, and graded home assignments
- Courses: *Algorithms I*, *Computability and Complexity*, *LaTeX Advanced*

Research Trainee @ University of Ferrara

Ferrara, Italy
09/2017 – 06/2018

- I optimized a C code for fluid dynamics simulations, targeting highly-parallel architectures
- I measured performance of different data layouts and memory access patterns

Technical skills

Machine learning	pytorch, computer vision, natural language processing
OS & task automation	Linux programming, UNIX shell, data processing & cleaning
Functional	Haskell, *Julia*
Object-oriented	C++, Java, Python
Low-level	C (parallel computing with MPI, OpenMP, pthread, CUDA), LLVM
Other	LaTeX, Ti*k*Z, MySQL, PHP, Javascript, Web scraping, REST APIs, Matlab, R, Go, linear programming

Relevant projects

Sole.jl – Third Millennium Symbolic Learning in Julia — *University of Ferrara*, *2023–2024*

The first framework for symbolic/interpretabile machine learning and modeling. Presented at JuliaCon2023.

ModalDecisionTrees.jl – Novel Decision Trees in Julia — *University of Ferrara*, *2021–2023*

Interpretable classification of data with dimensional components, such as audio recordings, images, videos, and EEG signals. Presented at JuliaCon2022.

Transparent COVID–19 diagnosis from audio samples of breath and cough — *University of Ferrara*, *2021*

Modal decision trees allow the extraction of knowledge in *explicit* form, able to explain the relation between vocal patterns in cough/breath samples and the presence of COVID-19 in a human subject. [1]

Pitòn – Rule extraction from MySQL databases — *University of Ferrara*, *2020*

Laravel Package (PHP) for training rule-based classification models from data stored in MySQL databases.

Class Semantic Awareness for neural networks — *University of Gothenburg*, *2020*

Attempt at improving the standard softmax-based classification framework for neural networks.

Dimensionality reduction: a performance comparison of PCA, LDA and FJLT — *National University of Singapore*, *2019*

EasyG – Classifying Electrocardiograms using deep learning — *University of Gothenburg*, *2019*

Extracurriculars & awards

2023 **Member**, it-ER Ambassador network
Participant, JuliaCon – Official Julia conference
2022 **Winner**, Acceleration Programme @ MAGICA Summer School, H-Farm
Participant, JuliaCon – Official Julia conference (online edition)
Participant, Technological Contest @ 37th Italian Conference on Computational Logic (CILC)
2021 **Finalist**, Huawei Italy University Challenge
Participant, Talents for Open Innovation
TV & news appearance, Focus on a research work I conducted on TV program "Oggi è un Altro Giorno"
2019 **Participant**, CS&E Hackathon
2018 **Finalist**, How to fight global warming with your wallet (TEDxGöteborg)
2017 **Participant**, "Informatici Senza Frontiere" Festival

Languages

Italian	Native speaker
English	IELTS Academic score: 7.0

Personal interests

Learning	Touch typing, ergonomics, codes, languages
Music	Arrangement, Professional studies of jazz guitar and piano
Entertainment	Video-editing, improv
Sport	Climbing, table tennis

Publications

[1] F. Manzella, G. Pagliarini, G. Sciavicco, and I. E. Stan. "Interval Temporal Random Forests with an Application to COVID-19 Diagnosis". In: *Proceedings of the 28th International Symposium on Temporal Representation and Reasoning (TIME 2021)*. Vol. 206. LIPIcs. Schloss Dagstuhl – Leibniz-Zentrum für Informatik, 2021, 7:1–7:18. URL: https://doi.org/10.4230/LIPIcs.TIME.2021.7.

[2] G. Bonaccorsi, M. Giganti, M. Nitsenko, G. Pagliarini, G. Piva, and G. Sciavicco. "Predicting treatment recommendations in postmenopausal osteoporosis". In: *J. Biomed. Informatics* 118 (2021), p. 103780. URL: https://doi.org/10.1016/j.jbi.2021.103780.

[3] G. Pagliarini and G. Sciavicco. "Decision Tree Learning with Spatial Modal Logics". In: *Proceedings 12th International Symposium on Games, Automata, Logics, and Formal Verification (GandALF)*. Vol. 346. EPTCS. 2021, pp. 273–290. URL: https://doi.org/10.4204/EPTCS.346.18.

[4] G. Pagliarini, G. Sciavicco, and I. E. Stan. "Multi-Frame Modal Symbolic Learning". In: *Proceedings of the 3rd Workshop on Artificial Intelligence and Formal Verification, Logic, Automata, and Synthesis hosted by the 12th International Symposium on Games, Automata, Logics, and Formal Verification (GandALF)*. Vol. 2987. CEUR Workshop Proceedings. CEUR-WS.org, 2021, pp. 37–41. URL: https://ceur-ws.org/Vol-2987/paper7.pdf.

[5] M. Coccagna, F. Manzella, S. Mazzacane, G. Pagliarini, and G. Sciavicco. "Statistical and Symbolic Neuroaesthetics Rules Extraction from EEG Signals". In: *Proceedings of the 9th International Work-Conference on the Interplay Between Natural and Artificial Computation (IWINAC)*. Vol. 13258. Lecture Notes in Computer Science. Springer, 2022, pp. 536–546. URL: https://doi.org/10.1007/978-3-031-06242-1%5C_53.

[6] I. E. Stan, G. Sciavicco, E. Muñoz-Velasco, G. Pagliarini, M. Milella, and A. Paradiso. "On Modal Logic Association Rule Mining". In: *Proceedings of the 23rd Italian Conference on Theoretical Computer Science (ICTCS)*. Vol. 3284. CEUR Workshop Proceedings. CEUR-WS.org, 2022, pp. 53–65. URL: https://ceur-ws.org/Vol-3284/492.pdf.

[7] D. Della Monica, G. Pagliarini, G. Sciavicco, and I. E. Stan. "Decision Trees with a Modal Flavor". In: *Proceedings of the 21st International Conference of the Italian Association for Artificial Intelligence (AIxIA)*. Vol. 13796. Lecture Notes in Computer Science. Springer, 2022, pp. 47–59. URL: https://doi.org/10.1007/978-3-031-27181-6%5C_4.

[8] G. Pagliarini, S. Scaboro, G. Serra, G. Sciavicco, and I. E. Stan. "Neural-Symbolic Temporal Decision Trees for Multivariate Time Series Classification". In: *29th International Symposium on Temporal Representation and Reasoning (TIME)*. Vol. 247. LIPIcs. Schloss Dagstuhl – Leibniz-Zentrum für Informatik, 2022, 13:1–13:15. URL: https://doi.org/10.4230/LIPIcs.TIME.2022.13.

[9] G. Pagliarini and G. Sciavicco. "Interpretable Land Cover Classification with Modal Decision Trees". In: *European Journal of Remote Sensing* 56.1 (2023), p. 2262738. URL: https://doi.org/10.1080/22797254.2023.2262738.

[10] M. Milella, G. Pagliarini, A. Paradiso, and I. E. Stan. "Multi-Models and Multi-Formulas Finite Model Checking for Modal Logic Formulas Induction". In: *Short Paper Proceedings of the 4th Workshop on Artificial Intelligence and Formal Verification, Logic, Automata, and Synthesis hosted by the 21st International Conference of the Italian Association for Artificial Intelligence (AIxIA)*. Vol. 3311. CEUR Workshop Proceedings. CEUR-WS.org, 2022, pp. 81–85. URL: https://ceur-ws.org/Vol-3311/paper13.pdf.

[11] F. Manzella, G. Pagliarini, G. Sciavicco, and I. E. Stan. "The voice of COVID-19: Breath and cough recording classification with temporal decision trees and random forests". In: *Artificial Intelligence in Medicine* 137 (2023), p. 102486. URL: https://doi.org/10.1016/j.artmed.2022.102486.

[12] G. Bechini, E. Losi, L. Manservigi, G. Pagliarini, G. Sciavicco, I. E. Stan, and M. Venturini. "Statistical Rule Extraction for Gas Turbine Trip Prediction". In: *Journal of Engineering for Gas Turbines and Power* 145.5 (2023). URL: https://doi.org/10.1115/1.4056287.

[13] E. Caselli, M. Coccagna, A. Gatti, F. Manzella, S. Mazzacane, G. Pagliarini, V. Sironi, and G. Sciavicco. "Towards an Objective Theory of Subjective Liking: a First Step in Understanding the Sense of Beauty". In: *Plos ONE* 8.6 (2023), pp. 1–20. URL: https://doi.org/10.1371/journal.pone.0287513.

[14] G. Pagliarini, A. Paradiso, S. Rubin, G. Sciavicco, and I. E. Stan. "Heuristic Minimization Modulo Theory of Modal Decision Trees Class-Formulas". In: *Short Paper Proceedings of the 5th Workshop on Artificial Intelligence and Formal Verification, Logic, Automata, and Synthesis hosted by the 22nd International Conference of the Italian Association for Artificial Intelligence (AIxIA 2023), Rome, Italy, November 7, 2023*. Vol. 3629. CEUR Workshop Proceedings. CEUR-WS.org, 2023, pp. 49–53. URL: https://ceur-ws.org/Vol-3629/paper8.pdf.

[15] P. Cavina, F. Manzella, G. Pagliarini, G. Sciavicco, and I. E. Stan. "(Un)supervised Univariate Feature Extraction and Selection for Dimensional Data". In: *Proceedings of the 2nd Italian Conference on Big Data and Data Science (ITADATA)*. Vol. 3606. CEUR Workshop Proceedings. CEUR-WS.org, 2023. URL: https://ceur-ws.org/Vol-3606/paper51.pdf.

[16] M. Ghiotti, F. Manzella, G. Pagliarini, G. Sciavicco, and I. E. Stan. "Evolutionary Explainable Rule Extraction from (Modal) Random Forests". In: *ECAI 2023 - 26th European Conference on Artificial Intelligence, September 30 - October 4, 2023, Kraków, Poland - Including 12th Conference on Prestigious Applications of Intelligent Systems (PAIS 2023)*. Vol. 372. Frontiers in Artificial Intelligence and Applications. IOS Press, 2023, pp. 827–834. URL: https://doi.org/10.3233/FAIA230350.

[17] F. Manzella, G. Pagliarini, G. Sciavicco, and I. E. Stan. "Efficient Modal Decision Trees". In: *AIxIA 2023 - Advances in Artificial Intelligence - 22nd International Conference of the Italian Association for Artificial Intelligence, AIxIA 2023, Rome, Italy, November 6-9, 2023, Proceedings*. Vol. 14318. Lecture Notes in Computer Science. Springer, 2023, pp. 381–395. URL: https://doi.org/10.1007/978-3-031-47546-7%5C_26.

Personal Data

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