Hugo Abreu

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Education

2021 – 2023 **Master's degree in Quantum Information**, *Sorbonne Université.*
- *Quantum Mechanics, Quantum Kinematics, Quantum Circuits and Logic Gates, Classical and Quantum Shannon Information Theory, Probabilities, High Performance Computing, 3D graphics (project on Schrödinger's smoke: fluid simulation using Incompressible Schrödinger Flow)*

2020 – 2022 **Master's degree in Artificial Intelligence**, *Sorbonne Université.*
- *Ontology and Logic, Complexity Theory, Game Theory, Distributed Algorithms, Graph Theory, Decision Theory, Multi-agent systems, Constraint Programming, Statistics, Machine learning*

2017 – 2020 **CPES Multidisciplinary Undergraduate degree**, *PSL Research University.*
Selective multidisciplinary degree with progressive specialization

2019 – 2020 **Mathematics and Computer Science for Decision and Data**, *Université Paris Dauphine.*
- *Probabilities / Lebesgue Integral, Machine Learning, Logic, Algorithms in Graphs, Machines, Languages and Compilation, Linear Programming, Networks and Infrastructures, Mathematical Foundations for Decision Support, Introduction to Symbolic AI, Numerical Methods: Optimization*

Supplementary coursework:
- *Artificial Vision* (M1 ENS Ulm)

2018 – 2019 **Mathematics and Physics**, *École Normale Supérieure, Mines Paris-Tech.*
- *Fundamental Mathematics, Advanced Probabilities, Topology and Analysis, Differential Calculus and Differential Equations, Algorithms and Applications, Introduction to Machine Learning, Advanced Optics, Thermodynamics / Statistical Physics, Electromagnetism I and II, Philosophy of sciences, Cross Literature, English*

Supplementary coursework:
- *Macroeconomics and Economic Policies I and II, Contemporary History of the Middle East*

2017 – 2018 **Science**, *Lycée Henri IV.*
- *Mathematics, Physics, Chemistry, Computer Science, Biology, French Literature, English*

Supplementary coursework:
- *Macro-Economics, Micro-Economics, Philosophy, German*

2015 – 2017 **Scientific Baccalauréat**, *Lycée Français Charles Lepierre de Lisbonne*, Portugal, Mathematics Option.

Internships

02/2022 – 06/2022 **Mayers-Yao self-testing in larger classes of entangled states**, *Sorbonne Université.*
Project done under the supervision of Ivan Supic. The aim is to relate the Mayers-Yao self-testing condition to some Bell inequality, and to try to generalize it to larger classes of entangled states. Started by using Semi-definite Programming techniques to show that Mayer Yao correlations are non local, and now trying to generalize them.

Last update: April 4, 2022

04/2021 – 08/2021	**Review of Algebraic Machine Learning**, *Champalimaud Foundation / Algebraic AI*, Lisbon, Portugal. Funded by the European Commission's H2020 ICT48 project ALMA: Human Centric Algebraic Machine Learning (grant 952091). Study of AML (Algebraic Machine Learning), a novel approach to Machine Learning introduced by Fernando Martin-Maroto and Gonzalo de Polavieja. Important concepts were singled out, implicit prerequisites were explicited, and a more formal connection with concepts in Universal Algebra was attempted. A parallel implementation of full crossing, an important operation for AML, running in in-memory processing devices (UPMEM), was also built.
02/2020 – 06/2020	**Deep Reinforcement Learning applied to financial markets**, *Université Paris Dauphine / AiSquare*, Paris, France. Bachelor thesis, supervised by D. Saltiel. Used Advantage Actor Critic methods to design trading strategies for continuous futures contracts. Created reward functions scaling trade positions based on market volatility, considering both discrete and continuous action spaces. The resulting models were put into production.
02/2019 – 06/2019	**Automatic search of neural-network architectures for the game of Go**, *Université Paris Dauphine*, LAMSADE, Paris, France. Internship with T. Cazenave at the LAMSADE laboratory. Used Deep Reinforcement Learning techniques to find neural-network architectures for the game of Go. Adapted and extended ENAS (Efficient Neural Architecture Search)
06/2018 – 08/2018	**Trajectory-detection in large animal groups: idtracker.ai**, *Champalimaud Foundation*, de Polavieja Lab, Lisbon, Portugal. Internship in the de Polavieja lab, where I learned to use deep-learning tools: mainly through the Keras front-end, but also directly through Tensorflow. I started by following the book "Deep-learning with Python", and then helped building idtracker.ai and tested it with small datasets of Zebrafish videos.

Skills

Tools	GNU/Linux, LaTeX, Emacs ♡, Git
GNU/Linux	Debian (sponsored maintainer)
Languages	C, C++, Python, Lisp (Common Lisp, Emacs Lisp), R, Rust, Prolog
ML	TensorFlow, Pytorch, Keras
HPC	MPI, OpenMP, UPMEM

Language Proficiency

Portuguese	Mother-tongue
French	Mother-tongue
English	Fluent (Bi-lingual)
German	Professional proficiency (B2)
Latin	profluenter loquor

Other

Music	Conservatory: Baroque Recorder and Piano (for 12 and 11 years, respectively). I occasionally play in jazz venues, and like to rehearse baroque music with friends (at the clavichord or the recorder). I sometimes also like to listen to and mix techno.
Photography	Street photography: several projects, in Portugal, France, Japan and Poland. Did several solo and group art shows, and edited a book ("fragments nippons", 2016). Some of my photos can be found in my flickr.