Henrique S. Assumpção

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Education

Universidade Federal de Minas Gerais   Jan 2020 - Dec 2024
Bachelor Degree in Computer Science (CGPA: 93/100)   *Belo Horizonte, Minas Gerais*

- **Relevant Coursework in CS:** Data Structures (C,C++), Algorithms (C++, Python), Data Science (Python), Machine Learning (Python), Parallel and Distributed Systems (C,Python), Quantum Computing (Python), Operating Systems (C), Software Engineering (JS,Python).
- **Relevant Coursework in Mathematics:** Real Analysis, Linear Algebra, Rings and Modules, Groups and Fields, Introduction to Topology, Graph Theory, Semidefinite Optimization, Calculus, Differential Equations, Probability, Discrete Mathematics.

Research Experience

Applications of Abstract Algebra to Quantum Computing and Graph Theory   Mar 2023 - Ongoing
Advisor: Prof. Gabriel Coutinho   *DCC-UFMG, Brazil*

- Worked on novel problems related to quantum walks on graphs and bounds for graph properties for graphs in association schemes and homogeneous coherent configurations.
- Collaborated with professors and researchers in Graph Theory and Algebraic Combinatorics, in order to develop useful theoretical and practical results for the problems at hand.
- Studied advanced subjects in Pure and Applied Mathematics, such as Functional Analysis, Commutative and Non-Commutative Algebra, and Combinatorial Optimization.

Money Laundering detection on banking networks   Aug 2021 - Feb 2022
Advisor: Prof. Fabricio Murai   *Inter S.A./DCC-UFMG*

- Developed *DELATOR*, a Graph Neural Network framework for detecting money laundering activity on large banking transaction networks. The framework was deployed by Inter S.A. and has already helped to detect and report multiple individuals involved in suspicious activity.
- Worked in a multidisciplinary team comprised of academic researchers and industry engineers, aimed at developing methods that were both scientifically significant and useful for real-world applications.
- Acquired useful experience with commercial grade development tools, such as AWS Sagemaker, Git, and Docker, in order to prototype a large-scale efficient framework for usage in the banking industry.
- Co-authored a scientific paper published at *IEEE Big Data 2022*, and presented our findings to the scientific community during the conference in Osaka, Japan.

Predictive Maintenance for industrial machinery   May - Jul 2021
Advisor: Prof. Fabricio Murai   *MINASLIGAS/DCC-UFMG*

- Developed a Variational Autoencoder model for predictive maintenance on siderurgy machinery, which achieved the best results amongst all other considered methods.
- Assisted in the posterior development of a production-ready full stack application for predictive maintenance for the machinery from MINASLIGAS.

Sentiment Analysis on Online Mental Health communities   Dec 2020 - May 2021
Advisors: Prof. Fabricio Murai, Prof. Ana Paula Couto da Silva   *DCC-UFMG*

- Developed a novel Recurrent Neural Network model for sentiment analysis on mental health online communities. The model predicts shifts in users' emotional tone based on their online posts, in order to further understand how interactions in online communities affect the emotional state of an individual.
- Collaborated with a team of experts on NLP and Sentiment Analysis, focused on performing scientifically rigorous experiments in order to assert the model's capabilities and limitations.
- Co-authored a scientific paper published at *Future Generation Computer Systems*, an international journal that allowed for greater disclosure of our work.

Professional Experience

Data Science Instructor Jun - Dec 2022

Usiminas/DCC-UFMG, Brazil

- Instructed multidisciplinary teams of professionals in developing useful software programs for applications at Usiminas, by employing a myriad of data science and machine learning-related methods.
- Taught Python programming concepts and techniques in the context of data science, such as Numpy and Pandas. Also taught technologies related to machine learning, such as Pytorch and Tensorflow.

A.I. Research & Development Mar - Aug 2021

Plus Three, USA

- Implemented NLP models for question answering and language generation on web applications.
- Wrote for the non-profit organization AIandYou, creating educational articles on many AI-related topics with the purpose of reaching minority groups in the US.
- Worked with an international multicultural team, following an agile development strategy in order to achieve peak performance when providing solutions for clients.
- Acquired practical experience in performing research in an industry context, focused on developing methods to solve the company's needs.

Publications

Conference Papers

- **Henrique S. Assumpção**, Fabrício Souza, Leandro Lacerda Campos, Vinícius T. de Castro Pires, Paulo M. Laurentys de Almeira, Fabricio Murai. DELATOR: Money Laundering Detection via Multi-Task Learning on Large Transaction Graphs. In *IEEE International Conference on Big Data (IEEE BigData)*, 2022. An earlier version of the paper was also published in Brazilian Workshop on Social Network Analysis and Mining (BraSNAM), 2022.

Journal Papers

- Bárbara Silveira, **Henrique S. Silva**, Fabricio Murai, Ana Paula C. da Silva. Predicting user emotional tone in mental disorder online communities. *Future Generation Computer Systems*, 2021.

Awards & Achievements

- Admitted for the Double Degree Master of Science in Engineering Program at *Télécom Paris (Institut Polytechnique de Paris, France)*, and received the Alumni Scholarship, 2023.
- Received the Best Paper Award at the *XI Brazilian Workshop on Social Network Analysis and Mining* (BraSNAM), 2022.
- Scored 2$^{\text{nd}}$ place in the admission test for Computer Science at *Universidade de São Paulo* (USP), 2020.
- Receive Honorable Mentions for public speaking for four consecutive years at SINUM (United Nations model simulation at Marista Dom Silvério High School), 2015 - 2018.

Skills

Programming Languages: Python, C++, C, Rust, JavaScript, SQL, Java, R, C#, Verilog, MATLAB, GNU Octave
Technologies: Pytorch, Tensorflow, Numpy, Scipy, Pandas, scikit-learn, Pytorch Geometric, DGL, StellarGraph
MLOps: AWS Sagemaker, AWS Elastic Inference
DevOps: GitLab CI/CD
Backend Tools: MySQL, SQLite, Docker
Tools: Linux, Git, LaTeX, Microsoft Excel
Languages: Portuguese (Native), English (C2), Spanish (B2), French (B1)