Henrique Soares Assumpção e Silva

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Education

M.S. in Computer Science Mar 2025 - Ongoing
Universidade Federal de Minas Gerais, Brasil *GPA: 95%*

- **Advisor**: Prof. Gabriel Coutinho;
- **Co-Advisor**: Prof. Csaba Schneider.

B.S. in Computer Science Jan 2020 - Feb 2025
Universidade Federal de Minas Gerais, Brasil *GPA: 94%*

- **Undergraduate Thesis**: Álgebras, grupos e grafos;
- **Advisor**: Prof. Gabriel Coutinho;
- **Minor**: Pure Mathematics.

Professional Experience

Machine Learning Researcher Jun 2025 - Ongoing
Inter, Brasil *Full Time*

- Researches novel machine learning models for finance and banking security using Inter's database, with an emphasis on large language models, graph neural networks and recommender systems.
- Develops scalable and efficient code for training and inference of large-scale machine learning models to support big data applications in a banking environment, optimizing performance and resource utilization across distributed systems

Data Science Instructor Jun - Dec 2022
Usiminas/DCC-UFMG, Brasil *Part time*

- Instructed multidisciplinary teams of professionals in developing useful software programs for applications at Usiminas, by employing state-of-the-art data analysis tools and machine learning algorithms;
- Taught Python programming concepts and technologies for data science and machine learning, such as Numpy, Pandas and Pytorch.

Undergraduate Researcher Aug 2021 - Feb 2022
Inter/DCC-UFMG, Brasil *Intership*

- Created *DELATOR*, a Graph Neural Network framework in Pytorch and DGL for detecting money laundering on large banking transaction networks. The framework efficiently operated on a large-scale banking database with over 20 million accounts and 100 million transactions, and was successfully employed by Inter's Anti-Money Laundering team to detect new cases of suspicious activity;
- Co-authored a paper published at *IEEE Big Data 2022*, and attended the conference in Osaka, Japan, in order to present the paper's findings to the scientific community.

A.I. Research & Development Mar - Aug 2021
Plus Three, USA *Part Time*

- Implemented NLP models for question answering and language generation in web applications, enhancing user interaction with chatbots;
- Researched innovative approaches to integrate chatbots into the company's website and authored dozens of educational AI articles for the nonprofit AIandYou, focusing on minority groups in the US.

Research Projects

Quantum algorithms for finance Jan 2025 - Jun 2025

Inter/DCC-UFMG, Brasil

- Investigated quantum algorithms for fraud detection and portfolio optimization, with an emphasis on kernel methods, in order to evaluate the feasibility of the techniques for possible applications at Inter;
- Implemented a Quantum Support Vector Machine model in Qiskit for experimenting with real-world data for the task of classifying fraudulent transactions in banking networks.

Graph theory and optimization Mar 2023 - Jan 2025

DCC-UFMG, Brasil

- Conducted research in graph theory and semidefinite optimization, obtaining novel results for graph parameters related to NP-hard problems such as MAXCUT and MAX 2-SAT, and co-authored a paper exhibiting the results, submitted in 2025;
- Developed algorithms for the analysis of clinical data of human brains, employing techniques from graph theory, linear algebra and optimization, and co-authored a paper discussing the results, to be published in 2025.

Predictive maintenance for industrial machinery May - Jul 2021

MINASLIGAS/DCC-UFMG, Brasil

- Constructed a Variational Autoencoder model in Pytorch for predictive maintenance on siderurgy machinery, leveraging structural information from time-series data in order to prototype an efficient model that yielded a 10% increase in overall accuracy;
- Developed and deployed, together with a team of programmers, a production-ready full-stack application for predictive maintenance of machinery at MINASLIGAS, enhancing operational efficiency and reducing downtime through data-driven insights.

Sentiment analysis on online mental health communities Dec 2020 - May 2021

DCC-UFMG, Brasil

- Developed a novel Recurrent Neural Network model in Pytorch for sentiment analysis on mental health online communities. The model efficiently and accurately predicted shifts in the emotional tone of online users, and outperformed all considered baselines by an average of 20%;
- Co-authored a scientific paper published at *Future Generation Computer Systems*, an international journal that allowed for greater disclosure of our work.

Papers

- **Henrique Assumpção**, Gabriel Coutinho. Semidefinite programming bounds on fractional cut-cover and maximum 2-SAT for highly regular graphs. *Submitted*. 2025.
- **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. *IEEE International Conference on Big Data* (IEEE BigData), 2022. Earlier version published in *Brazilian Workshop on Social Network Analysis and Mining* (BraSNAM), 2022.
- 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.

Technologies & Skills

Programming Languages: Python, C++, C, Rust, Java, JavaScript, SQL, R, C#
Technologies: Pytorch, Numpy, Scipy, Pandas, scikit-learn, Tensorflow, SageMath
MLOps: Amazon SageMaker, Amazon S3, Amazon EMR, Apache Spark
DevOps: GitLab, Git, Docker, AWS
Languages: Brazilian Portuguese (Native), English (C2), Spanish (B2), French (B1)

Awards

- Best Paper Award at the *XI Brazilian Workshop on Social Network Analysis and Mining* (BraSNAM), 2022.