

Cristovao Iglesias

Machine Learning
Researcher/Engineer

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Summary

I am a Machine Learning (ML) researcher and engineer with a Ph.D. in Computer Science (focused on ML) and a strong background in software engineering. With over 10 years of experience in ML, my academic and professional journey has equipped me with a solid foundation for developing ML systems tailored to real-world applications.

Skills

Languages: Python, Java, Javascript, SQL (PostgreSQL, MySQL), R, Julia, Ruby on Rails, C++

General ML Libraries and Frameworks: Scikit-Learn, Keras, TensorFlow, PyTorch

Developer Tools: Git, Docker, AWS Stack, Elasticsearch, Grafana, Kibana

Data Processing and Analysis: Pandas, NLTK, NumPy, SciPy

Expertise: Deep learning, Bayesian modeling, federated learning, NLP, LLM, and data fusion.

Education

Ph.D. in Computer Science (Machine Learning) <i>University of Ottawa, Canada</i>	2020/09 – 2024/09
M.Sc. in Informatics <i>Federal University of Rio de Janeiro, Brazil</i>	2017/09 – 2019/10
B.Sc. in Information Systems <i>Estácio de Sá University, Brazil</i>	2016/09 – 2019/11
B.Sc. in Biophysics (Bioinformatics) <i>Federal University of Rio de Janeiro, Brazil</i>	2008/03 – 2013/03

Work Experience

Machine Learning Research Assistant, Canada <i>University of Ottawa</i>	2021/01 – present
<ul style="list-style-type: none">Conducted advanced machine learning research, contributing to theoretical advancements and practical applications.Published research findings in journals and leading conferences (ICML, NeurIPS and FUSION).Co-supervisor of two undergraduate students.	
Machine Learning Engineer, Canada <i>University of Ottawa</i>	2020/02 – 2020/12
<ul style="list-style-type: none">Designed and implemented novel machine learning algorithms and systems to address real-world challenges.	
Web Development Professor, Brazil <i>Mundial and Mare Bank</i>	2019/05 – 2019/10
<ul style="list-style-type: none">Web Development using Javascript.	
Software Engineer, Brazil <i>Clavis Information Security (clavis.com.br)</i>	2017/03 – 2019/04
<ul style="list-style-type: none">Designed and developed new functionalities for security products using AWS stack, Python, Ruby on Rails, SQL, Elasticsearch, and Grafana.Enhanced the efficiency of stress (load) testing by reducing latency in final report delivery by 85% with improvements in data processing and analysis capabilities.Proposed a new product component for malicious URL detection using LSTM.	
Software Engineer (Intern), Brazil <i>EMC²</i>	09/2014 – 03/2015
<ul style="list-style-type: none">Developed plugins for Redmine using Ruby on Rails and PostgreSQL.	
Software Engineer (Intern), Australia <i>NICTA</i>	12/2012 – 03/2013
<ul style="list-style-type: none">Developed a visualization and analysis tool for the web in the GWAS area to work with genomic data. Development using Python, JavaScript, Python, D3.js.	

Software Engineer (Intern), Brazil *Laboratório de Bioinformática e Biologia Computacional, INCA*

2012/06 – 2012/11

- Modeled a relational database to analyze experimental protocols for obtaining protein three-dimensional structures. Development with MySQL and Python.

Bioinformatics Researcher (Intern), France *Laboratoire de Biotechnologie et Pharmacologie Génétique Appliquée, ENSC*

01/2011 - 02/2011

- Studied the initial steps of activation of BAX by BIM (BH3) through normal modes analysis of the vibration (NMA), optimization techniques, Python, cluster analysis, and analysis of modes consensus.

Bioinformatics Researcher (Intern), Brazil *Laboratory for Molecular Dynamics and Modelling, UFRJ*

03/2009 - 01/2011

- Developed tools and molecular dynamics simulation for drug design.
- Project developed using C/C++, Python, R, optimizations techniques, PCA, cluster analysis, and data Mining techniques

Current Projects

Enhancing the performance of fine-tuning of LLM with surrogate Bayesian model.

- Responsible for designing and implementing the surrogate Bayesian model, ensemble of LLM, and fine-tuning evaluation.
- Tools: Python, PyTorch, Llama, Mistral, Stable diffusion models, LoRa.
- Role: ML researcher
- Sponsors: Universality of Ottawa and Federal University of Rio de Janeiro

Completed Projects

A platform for automatic designing of resilient IoT applications from requirements documents with LLM

code: [RITA](#) 

- Responsible for the design and implementation of the platform architecture, dataset, and fine-tuning evaluation.
- Tools: Python, Docker, PyTorch, Fine-tuning LLM, NLP, MySQL, RoBERTa, GPT-3, NER, Anvil framework, Pandas, NumPy, and Seaborn, BERT, Transformers, ElMo.
- Publications: [\[5,10,13\]](#)
- Role: ML researcher/engineer

New Bayesian filtering approaches for fast and low-cost bioprocess monitoring with uncertainty quantification

Doc: [Thesis](#) 

- Responsible for designing, implementing, and evaluating three new Bayesian filtering approaches.
- Tools: Python, Julia, Docker, Bayesian filtering, Bayesian deep learning, hybrid models, uncertainty quantification, data fusion, Neural ODE, EKF, UKF, CKF, Global optimization, Genetic Algorithm, Bayesian Optimization.
- Publications: [\[8,9,11,12,12\]](#)
- Role: ML researcher

A Real-Time Respiration Monitoring and Classification System using a Depth Camera and Radars

Doc: [Journal Article](#) 


- Main responsible for designing and implementing the real-time monitoring and classification tasks.
- Tools: Random forest classifier, Python, C++, depth camera, data fusion and radar sensors.
- Publications: [\[2\]](#)
- Role: ML engineer

Monitoring elderly people in nursing homes

- Main responsible for the implementation of the system.

- Tools: Python, cameras and movement sensors.
- Role: ML engineer

Enabling uncertainty quantification in federated-learning clients

code: [2S](#) 

- Responsible for designing and implementing the two students (algorithm).
- Tools: Python, Julia, federated learning, deep learning, ensemble, Gaussian process regression
- Publications: [\[7\]](#)
- Role: ML researcher/engineer

Enabling decision-making modeling for Personalized Monitoring System

code: [DEMDE](#) 

- Responsible for the design and implementation of the probabilistic domain model.
- Tools: Python, Bayesian network, UML, data fusion, uncertainty quantification, conceptual model (software engineering)
- Publications: [\[4, 6\]](#)
- Role: ML researcher/engineer

Handling Massive Proportion of Missing Labels in Multivariate Long-Term Time Series Forecasting

code: [handlingMPML](#) 

- Responsible for designing and implementing the two-step process approach where interpolation and model predictions are separated to enable the integration of prior domain knowledge.
- Tools: Python, TensorFlow, Gaussian process regression, LSTM, Deep Learning
- Publications: [\[3\]](#)
- Role: ML researcher/engineer

Agile software development learning through open hardware project

Doc: [Conference Article](#) 

- Responsible for teaching Agile Methods through an Open Hardware project.
- Tools: Arduino, Scrum, Extreme Programming (XP), Lean Kanban, Lean Startup Techniques
- Publications: [\[1\]](#),
- Role: Software engineer

Publications

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- [1] Avelino F Gomes Filho, Carlos FC De Resende, Cristóvão F Iglesias, José G Mayworm, Marco EO Jardim, Raphael D Paiva, and Rodrigo De Toledo. Agile software development learning through open hardware project. In *2015 6th Brazilian Workshop on Agile Methods (WBMA)*, pages 40–47. IEEE, 2015.
 - [2] Shan He, Zixiong Han, Cristóvão Iglesias, Varun Mehta, and Miodrag Bolic. A real-time respiration monitoring and classification system using a depth camera and radars. *Frontiers in Physiology*, 13:799621, 2022.
 - [3] Cristovão Iglesias, Varun Mehta, Alina Venereo-Sanchez, Xingge Xu, Julien Robitaille, Robert Voyer, René Richard, Nabil Belacel, Amine Kamen, and Miodrag Bolic. Handling massive proportion of missing labels in multivariate long-term time series forecasting. In *Journal of Physics: Conference Series*, volume 2090, page 012170. IOP Publishing, 2021.
 - [4] Cristóvão Iglesias, Claudio Miceli, and David Silva. A domain model for personalized monitoring system based on context-aware data fusion. In *2019 22th International Conference on Information Fusion (FUSION)*, pages 1–8. IEEE, 2019.
 - [5] Cristovão F Iglesias, Rongchen Guo, Pedro Nucci, Claudio Miceli, and Miodrag Bolic. Automated extraction of iot critical objects from iot storylines, requirements and user stories via nlp. In *2023 10th IEEE Swiss Conference on Data Science (SDS)*, pages 104–107. IEEE, 2023.
 - [6] Cristovão F Iglesias, Pedro Nucci, Claudio Miceli, and Miodrag Bolic. Demde: Decision making design based on bayesian network for personalized monitoring system. In *2023 26th International Conference on Information Fusion (FUSION)*, pages 1–8. IEEE, 2023.

- [7] Cristovão Iglesias Jr, Sidney Alves de Outeiro, Claudio Miceli de Farias, and Miodrag Bolic. Two students: Enabling uncertainty quantification in federated learning clients. In *NeurIPS 2024 Workshop on Bayesian Decision-making and Uncertainty*.
- [8] Cristovão Freitas Iglesias Jr and Miodrag Bolic. How not to make the joint extended kalman filter fail with unstructured mechanistic models. *Sensors*, 24(2), 2024.
- [9] Cristovão Freitas Iglesias Jr and Miodrag Bolic. Limitations of joint and dual nonlinear kalman estimators in low-cost bioprocess monitoring. *workshop LXAI of ICML 2024*, 24(2), 2024.
- [10] Cristovao Freitas Iglesias Jr, Claudio Miceli, and Miodrag Bolic. An architectural design decision model for resilient iot application. *arXiv preprint arXiv:2306.10429*, 2023.
- [11] Cristovão Freitas Iglesias Jr, Milica Ristovski, Miodrag Bolic, and Miroslava Cuperlovic-Culf. raav manufacturing: the challenges of soft sensing during upstream processing. *Bioengineering*, 10(2):229, 2023.
- [12] Cristovão Freitas Iglesias Jr, Xingge Xu, Varun Mehta, Mounia Akassou, Alina Venereo-Sanchez, Nabil Belacel, Amine Kamen, and Miodrag Bolic. Monitoring the recombinant adeno-associated virus production using extended kalman filter. *Processes*, 10(11):2180, 2022.
- [13] Luis Eduardo Pessoa, Cristovao Freitas Iglesias Jr, and Claudio Miceli. Rita: Automatic framework for designing of resilient iot applications. *LaFUSION*, 2024.