Cristovão Iglesias

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Summary I am a ML Engineer with a robust background in software engineering. My experience spans across various projects, from molecular dynamics simulations to digital twins development. Currently, I completed a Ph.D. in Computer Science (Machine Learning) at the University of Ottawa. I bring expertise in deep learning, Bayesian modeling, federated learning, NLP/LLM and data fusion. My academic journey with over 10 years of experience in ML has equipped me with a strong foundation in developing ML systems for real-world applications.

Skills

- **Data Science & Machine Learning**: Deep Learning, Bayesian modeling, NLP, LLM, Data Fusion, Scientific machine learning, Nonlinear Kalman filters, Time-series analysis, uncertainty quantification and Federated learning
- **Programming & Development**: Python, SQL (PostgreSQL, MySQL), R, Julia, Ruby on Rails, Docker, AWS Stack, TensorFlow, PyTorch, JAVA, C++, Elasticsearch and Grafana.
- **Communication & Teamwork:** Proven ability to work independently and collaboratively with technical and business teams. Effective in translating complex technical concepts into business language.
- **Problem Solving & Optimization**: Skilled in exploring and implementing innovative statistical approaches to optimize data pipelines and algorithms.
- **Continuous Learning:** Strong focus on continuous learning and staying updated with emerging technologies in analytics.

Education

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

Professional Experience _____

Machine Learning Researcher Assistant, University of Ottawa, Canada (2020/02 – Present)

Project 4 – A platform for automatic designing of resilient IoT applications from requirements documents.

- Utilized Python, Docker, Pytorch, Fine-tuning LLM, NLP, MySQL
- Responsible for design and implementation of the main platform's components.
- Publications reference: 8, 9, 14

Project 3 - New Bayesian filtering approaches for fast and low-cost bioprocess monitoring with uncertainty quantification.

- Utilized Python, Julia, Docker, TensorFlow for advanced data modeling and analysis.
- Main responsible for design and develop the soft sensors with uncertainty quantification using a novel nonlinear Bayesian filtering approaches.
- Publications: 3, 6, 10, 11, 12, 13

Project 2 - A Real-Time Respiration Monitoring and Classification System using a Depth Camera and Radars.

- Implemented machine learning models in Python and C++ for real-time monitoring and classification systems.
- Main responsible for design and implementation the real-time tasks.
- Publications: 5

Project 1 - Monitoring elderly people in nursing homes.

- Project developed using python, cameras and movement sensors.
- Main responsible for implementation the system.

Software Engineer, Clavis Segurança da Informação, Brazil (2017/03 – 2019/04)

- Led the development of new functionalities for security products using bash scripting, AWS stack, Python, Ruby on Rails, SQL, Elasticsearch and Grafana.
- Enhanced data processing and analysis capabilities, contributing to project optimization.

Software Engineering (Internship), EMC2, Brazil (09/2014 - 03/2015)

- Development of plugins for Redmine using Ruby on Rails and PostgreSQL.

Software Engineering (Internship), NICTA, Australia (12/2012 - 03/2013)

- Development of a visualization and analysis tool for the web in the GWAS area, to work with genomic data. Project developed using JavaScript, Python, D3.js. Available in: link1 and link2.

Bioinformatics Researcher (Internship), Ecole Normale Supérieure de Cachan, Laboratoire de Biotechnologie et Pharmacologie Génétique Appliquée, France (01/2011- 02/2011)

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

Bioinformatics Researcher (Internship), Health Sciences Center, Federal University of Rio de Janeiro - Brazil, Modeling and Molecular Dynamics Laboratory – Brazil, (03/2009 - 01/2011)

- Molecular Dynamics Simulation for drug design. Project developed using C/C++, Python, R, optimizations techniques, PCA, Cluster analysis and Data Mining techniques.

Idioms

English, Portuguese and Spanish

Awards & Honors

- Best Work of the Section, XXXV Giulio Massarani Journey of Scientific Initiation, UFRJ (2013)
- Honorable Mention, Health Sciences Center, XXXII Giulio Massarani Journey of Scientific Initiation, UFRJ (2010)

Publications (link)

1. A domain model for personalized monitoring system based on context-aware data fusion (**FUSION** 2019).
   Skill: Software Engineering, data fusion

2. Handling Massive Proportion of Missing Labels in Multivariate Long-Term Time Series Forecasting (**IC-MSQUARE** 2021).
   Code: https://github.com/CARG-uOttawa/handlingMPML/tree/main
   Skills: Python, TensorFlow, LSTM, Deep Learning

3. Monitoring the Recombinant Adeno-Associated Virus Production using Extended Kalman Filter (**Processes** Journal - 2022).
    Code: https://github.com/CARG-uOttawa/EKF4AAVproduction
    Skills : Julia, Bayesian Inference for optimization, EKF, NODE

4. Agile software development learning through open hardware project (**WBMA** - 2015.
    Skill: Software Engineering

5. A real-time respiration monitoring and classification system using a depth camera and radars (**Frontiers** – 2022).
    a. Skills: Python, Classification, data fusion.

6. rAAV Manufacturing: The Challenges of Soft Sensing during Upstream Processing (**Bioengineering Journal**– 2023).

7. DEMDE: Decision Making Design based on Bayesian Network for Personalized Monitoring System (**FUSION** - 2023).
    Code: https://github.com/cristovaoiglesias/demde
    Skills : Bayesian network

8. An Architectural Design Decision Model for Resilient IoT Application. arXiv preprint (**arXiv** – 2023).
    Skill: Software Engineering

9. Automated Extraction of IoT Critical Objects from IoT Storylines, Requirements and User Stories via NLP (**SDS** - 2023).
    Code:
    https://github.com/cristovaoiglesias/iot_critical_obj_extraction_via_nlp
    Skills : NLP, Python, Tensorflow, Pytorch, BERT, Transformers, ElMo

10. How Not to Make the Joint Extended Kalman Filter Fail with Unstructured Mechanistic Models (**Sensors** Journal – 2024).
    Code: https://github.com/cristovaoiglesias/JEKF-SANTO
    Skills : Julia, Optimization, Bayesian Inference

11. Hybrid Nonlinear Kalman Estimators for Low-Cost Bioprocess Monitoring (Submitted for **EAAI** 2024)
    Code: https://github.com/cristovaoiglesias/HNKE
    Skills : Julia, Optimization, Bayesian Inference, Filters, Deep Learning

12. Batch Bayesian Auto-Tuning for Nonlinear Kalman Estimators (Submitted for **Nature Scientific Report** 2024)
    Code: https://github.com/cristovaoiglesias/BAT
    Skills : Julia, Global optimization, Genetic Algorithm, Bayesian

Optimization, Bayesian Inference

13. Limitations of Joint and Dual Nonlinear Kalman Estimators in Low-Cost Bioprocess Monitoring (LatinX- **ICML** 2024)
    Code: https://github.com/cristovaoiglesias/NKEs-SANTO
    Skills: Julia, Global optimization, Nonlinear Kalman Estimators, Bayesian Inference

14. Pessoa, Luis, Iglesias Jr, Cristovão, et al. "*RITA: Automatic Framework for Designing of Resilient IoT Applications*". **LaFUSION** 2024.
    Code: https://github.com/LEpessoa/RITA
    Skills: Python, LLM, NLP
    Video: https://www.youtube.com/watch?v=A-FVh4axTW0

15. Two Students: Enabling Uncertainty Quantification in Federated Learning Clients. (BDU – **NeurIPS** 2024).
    Code: https://github.com/cristovaoiglesias/2S
    Skills: Python, Julia, federated learning