Héber Hwang Arcolezi

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Postdoctoral researcher with expertise in data privacy and privacy-preserving machine learning. I am passionate about research and committed to the creation and development of high-quality solutions.

Education

2019 – 2022	**Ph.D. in Computer Science:** University Bourgogne Franche-Comté (UBFC), France. **Research:** Production of Categorical Data Verifying Differential Privacy: Conception and Applications to Machine Learning. **Funding:** CADRAN project, Region Bourgogne Franche-Comté. **Supervisors:** Jean-François Couchot, Bechara Al Bouna, Xiaokui Xiao. **Dissertation Jury:** Mathieu Cunche, Benjamin Nguyen, Mário S. Alvim, Stéphane Chrétien.
2017 – 2019	**M.Eng. in Electrical Engineering:** São Paulo State University (UNESP), Brazil. **Research:** A Novel Robust and Intelligent Control Based Approach for Human Lower Limb Rehabilitation via Neuromuscular Electrical Stimulation. **Funding:** Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES). **Supervisor:** Aparecido Augusto de Carvalho. **Dissertation Jury:** Marcelo A. A. Sanches, Raphaël Couturier.
2012 – 2017	**B.Eng. in Electrical Engineering:** Mato Grosso State University (UNEMAT), Brazil. **Research:** Um Estudo Complementar ao Projeto de Controle PID no Caso do Pêndulo Invertido. **Supervisor:** Rogério B. Quirino. **Dissertation Jury:** Rogério Lúcio Lima, Maria Helena Vieira Kelles.

Research Experience

2022	**Postdoctoral Researcher at Comète team - Inria, LIX (Current Position):** Research on local differential privacy, machine learning privacy, and machine learning fairness. **Funding:** HYPATIA Project. **Hosted by DR1** Catuscia Palamidessi.
2022	**Visiting Researcher at Universidade Federal de Minas Gerais – UFMG (3 weeks):** Investigation and development of data-driven solutions based on machine learning for applications in medicine. **Hosted by Prof.** Ligia de Loiola Cisneros.
2021	**Visiting Researcher at Université du Québec à Montréal – UQAM (1 month):** Investigation of privacy risks when collecting multidimensional data with local differential privacy. **Funding:** EIPHI Graduate School (Ph.D. Student Mobility Grant) **Hosted by Prof.** Sébastien Gambs.

Additional Training

2021	**Participant of the 6th Rencontre Entreprises DOCtorants en Sécurité (REDOCS'21):** Research of a privacy-preserving solution for collecting user statistics by cryptographic and differential privacy means (Final Presentation).
2021	**Participant and Presenter at the Data Anonymisation and Reidentification Competition (DARC), part of the 11th Atelier sur la Protection de la Vie Privée (APVP'21):** Research and development of a privacy-preserving solution for trajectory data.
2021	**Participant of the 1st Inria-DFKI European Summer School on AI (IDAI'21).**
2020	**Participant and Presenter at the 15th IFIP Summer School on Privacy and Identity Management:** Presentation of a privacy-preserving call-detail-records processing system research paper.

Teaching Experience

2022	**Teaching Assistant on Introduction to Computer Science with Java at École Polytechnique (40 hours):** Assist students enrolled in the discipline and evaluate students' tests.
2021	**Teacher at Workshop on Privacy for IoT at Master IoT UBFC (20 hours):** Theory and practical methods of anonymization for 12 students of Master 1.
2020	**Teacher at Workshop on Privacy for IoT at Master IoT UBFC (20 hours):** Theory and practical methods of anonymization for 21 students of Master 2.

Work Experience

2017	**Electrical Engineer Intern at "Losan Engineering" (3 months):** Developing low and high-tension electrical projects.
2013 – 2016	**Responsible for the Development of Cooperative Groups in the FOCCO program at UNEMAT (4 years):** Plan, execute, and maintain study groups with the purpose of increasing the permanence and approval rate in undergraduate courses.
2016	**Co-Founder and Voluntary Member at "Energy Electrical Projects and Consulting Junior Enterprise" (1 year):** Low and high tension electrical projects; optical fibers and telecommunications projects; and consulting.
2014	**Voluntary Tutor on Differential and Integral Calculus at UNEMAT (6 months):** Assist students enrolled in the discipline, dedicate and plan activities to develop student learning.

Academic Community Services

Program Committee

2022	European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML/PKDD)
2022	International Conference on Software Engineering Advances (ICSEA)

External Reviewer

2021, 2022	Proceedings on Privacy Enhancing Technologies Symposium (PoPETS)
2020	Security and Communication Networks Journal

Conference Organization

2017	II Semana da Animação, Modelagem e Automação at UNEMAT.
2014	I Semana da Faculdade de Ciencias Exatas at UNEMAT.

Software

Python	Multiple Frequency Estimation Under Local Differential Privacy in Python: multi-freq-ldpy. MIT License, GitHub.

Peer-Reviewed Publications: The superscript * indicates equal contributions to the paper.

Journal Articles (6): Classified according to four JCR (SCImago Journal Rank) quartiles (Q1, Q2, Q3, and Q4) and its Impact Factor (IF), retrieved in the year of publication.

Summary of Journal Article Publications by JCR quartiles.

Q1	Q2	Q3	Q4	Unranked
4	0	0	1	1

2021 **Privacy-Preserving Prediction of Victim's Mortality and Their Need for Transportation to Health Facilities.**
*Arcolezi, H. H.; *Cerna, S.; Couchot, J.-F.; Guyeux, C.; Makhoul, A.
IEEE Transactions on Industrial Informatics, vol. 18, p.5592-5599. JCR: **Q1**, IF: **10.215**.
https://doi.org/10.1109/tii.2021.3123588

2021 **Machine learning-based forecasting of firemen ambulances' turnaround time in hospitals, considering the COVID-19 impact.**
Cerna, S.; Arcolezi, H. H.; Guyeux, C.; Royer-Fey, G.; Chevallier, C.
Applied Soft Computing, vol. 109, p.107561. JCR: **Q1**, IF: **6.725**.
https://doi.org/10.1016/j.asoc.2021.107561

2021 **RISE Controller Tuning and System Identification Through Machine Learning for Human Lower Limb Rehabilitation via Neuromuscular Electrical Stimulation.**
Arcolezi, H. H.; Nunes, W. R. B. M.; de Araujo, R. A.; Cerna, S.; Sanches, M. A. A.; Teixeira, M. C. M.; de Carvalho, A. A.
Eng. Applications of Artificial Intelligence, vol. 102, p.104294. JCR: **Q1**, IF: **6.212**.
https://doi.org/10.1016/j.engappai.2021.104294

2021 **Preserving Geo-Indistinguishability of the Emergency Scene to Predict Ambulance Response Time.**
Arcolezi, H. H.; Cerna, S.; Guyeux, C.; Couchot, J.-F.
Mathematical and Computational Applications, vol. 26(3), p.56. JCR: –, IF: –.
https://doi.org/10.3390/mca26030056

2020 **Forecasting the Number of Firefighter Interventions per Region with Local-Differential-Privacy-Based Data.**
Arcolezi, H. H.; Couchot, J.-F.; Cerna, S.; Guyeux, C.; Royer, G.; Al Bouna, B.; Xiao, X.
Computers & Security, vol. 96, p.101888. JCR: **Q1**, IF: **3.579**.
https://doi.org/10.1016/j.cose.2020.101888

2020 **Identifying the knee joint angular position under neuromuscular electrical stimulation via long short-term memory neural networks.**

Arcolezi, H. H.; Nunes, W. R. B. M.; Cerna, S.; de Araujo, R. A.; Sanches, M. A. A.; Teixeira, M. C. M.; de Carvalho, A. A.
Research on Biomedical Engineering, vol. 36(4), p.511-526. JCR: **Q4**, IF: –.
https://doi.org/10.1007/s42600-020-00089-1

International Conference Proceedings (7): Classified according to four 2021 CORE (Computing Research and Education) rankings (A*, A, B, and C).

Summary of International Conference Papers by CORE ranks.

A*	A	B	C	Unranked
0	1	1	3	2

2021 **Random Sampling Plus Fake Data: Multidimensional Frequency Estimates With Local Differential Privacy.**
Arcolezi, H. H.; Couchot, J.-F.; Al Bouna, B.; Xiao, X.
International Conference on Information and Knowledge Management. CORE: **A** (Acceptance rate: 21.7%).
https://doi.org/10.1145/3459637.3482467

2020 **Mobility modeling through mobile data: generating an optimized and open dataset respecting privacy.**
Arcolezi, H. H.; Couchot, J.-F.; Baala, O.; Contet, J.-M.; Al Bouna, B.; Xiao, X.
International Wireless Communications and Mobile Computing. CORE: **B** (Acceptance rate: 38%).
https://doi.org/10.1109/iwcmc48107.2020.9148138

2020 **A Comparison of LSTM and XGBoost for Predicting Firemen Interventions.**
Cerna, S.; Guyeux, C.; Arcolezi, H. H.; Couturier, R.; Royer, G.
World Conference on Information Systems and Technologies. CORE: **C**.
https://doi.org/10.1007/978-3-030-45691-7_39

2020 **Longitudinal Collection and Analysis of Mobile Phone Data with Local Differential Privacy.**
Arcolezi, H. H.; Couchot, J.-F.; Al Bouna, B.; Xiao, X.
IFIP International Summer School on Privacy and Identity Management. CORE: –.
https://doi.org/10.1007/978-3-030-72465-8_3

2020 **Boosting Methods for Predicting Firemen Interventions.**
Cerna, S.; Guyeux, C.; Arcolezi, H. H.; Couturier, R.; Royer, G.
International Conference on Information and Communication Systems. CORE: –.
https://doi.org/10.1109/icics49469.2020.239488

2019 **Long Short-Term Memory for Predicting Firemen Interventions.** Ñahuis, S. L. C.; Guyeux, C.; Arcolezi, H. H.; Couturier, R.; Royer, G.; Lotufo, A. D. P.
International Conference on Control, Decision and Information Technologies. CORE: **C**.
https://doi.org/10.1109/codit.2019.8820671

2019 **A RISE-based Controller Fine-tuned by an Improved Genetic Algorithm for Human Lower Limb Rehabilitation via Neuromuscular Electrical Stimulation.**
Arcolezi, H. H.; Nunes, W. R. B. M.; Nahuis, S. L. C.; Sanches, M. A. A.; Teixeira, M. C. M.; de Carvalho, A. A.
International Conference on Control, Decision and Information Technologies. CORE: **C**.
https://doi.org/10.1109/codit.2019.8820357

National Conference Proceedings (5).

2020 **Prévisions geographiques du nombre d'interventions des pompiers respectant la confidentialité différentielle locale.**
Arcolezi, H. H.; Couchot, J.-F.; Cerna, S.; Guyeux, C.; Royer, G.; Al Bouna, B.; Xiao, X.
Conférence Nationale sur les Applications Pratiques de l'Intelligence Artificielle.
http://pfia2020.fr/wp-content/uploads/2020/08/Actes_CH_PFIA2020_V3.pdf

2019 **On the Ability to Identify the Knee Joint Position Under Neuromuscular Electrical Stimulation Using Long Short-Term Memory Neural Networks.**
Arcolezi, H. H.; Nunes, W. R. B. M.; de Araujo, R. A.; Cerna, S.; Sanches, M. A. A.; Teixeira, M. C. M.; de Carvalho, A. A.
Conferência Brasileira de Dinâmica, Controle e Aplicações.
http://soac.eesc.usp.br/index.php/dincon/xivdincon/paper/view/1685/1153

2019 **A Robust and Intelligent RISE-based Control for Human Lower Limb Tracking via Neuromuscular Electrical Stimulation.**
Arcolezi, H. H.; Nunes, W. R. B. M.; de Araujo, R. A.; Cerna, S.; Sanches, M. A. A.; Teixeira, M. C. M.; de Carvalho, A. A.
Conferência Brasileira de Dinâmica, Controle e Aplicações.
http://soac.eesc.usp.br/index.php/dincon/xivdincon/paper/view/1683/1152

2017 **Um Estudo Complementar do Controle PID Servo e Regulador Aplicado ao Sistema Pêndulo Invertido.**
Arcolezi, H. H.; Quirino, R. B.
Congresso Brasileiro de Educação em Engenharia.
http://www.abenge.org.br/sis_artigos.php

2017 **Um Estudo Complementar ao Projeto de Controle PID do Pêndulo Invertido.**
Arcolezi, H. H.; Quirino, R. B.
Congresso Nacional de Pesquisa e Ensino em Ciências.
https://editorarealize.com.br/artigo/visualizar/28867

Preprint (3): Submitted articles on peer-reviewed journals and/or conferences.

2022 **Multi-Freq-LDPy: Multiple Frequency Estimation Under Local Differential Privacy in Python.**
Arcolezi, H. H.; Couchot, J.-F.; Gambs, S.; Palamidessi, C.; Zolfaghari, M.
Submitted to: ECML/PKDD 2022. CORE: **A**.
https://arxiv.org/abs/2205.02648

2021 **Improving the Utility of Locally Differentially Private Protocols for Longitudinal and Multidimensional Frequency Estimates.**
Arcolezi, H. H.; Couchot, J.-F.; Al Bouna, B.; Xiao, X.
Submitted to: Digital Communications and Networks. JCR: **Q1**, IF: **6.797**.
Status: Proofreading (pre-publication).
https://arxiv.org/abs/2111.04636

2021 **Differentially Private Multivariate Time Series Forecasting of Aggregated Human Mobility With Deep Learning: Input or Gradient Perturbation?**
Arcolezi, H. H.; Couchot, J.-F.; Renaud, D.; Al Bouna, B.; Xiao, X.
Submitted to: Neural Computing and Applications. JCR: **Q2**, IF: **5.606**.
Status: Proofreading (pre-publication).
https://arxiv.org/abs/2205.00436

Presentations & Media

2022	**Invited talk:** Data anonymization and Artificial Intelligence models (in Portuguese). **In: Hospital Risoleta Tolentino Neves**. Hybrid format (in-person and online). Press journal.
2021	**Invited talk:** Improving Utility and Privacy in Multidimensional Frequency Estimates Under Local Differential Privacy. **In: Université du Québec à Montréal**. Hybrid format (in-person and online).
2021	**Invited talk:** Introduction to Privacy Preservation and Machine Learning Techniques in Healthcare (in Portuguese). **In: Universidade Federal de Minas Gerais.** Online.
2021	**Oral presentation:** Privacy-Preserving Human Mobility Analytics Through Mobile Phone Data. **In: APVP 2021** - 11e Atelier sur la Protection de la Vie Privée. Online.
2020	**Press journal:** Mesure Informatique de Ruptures de Service. **In: En Direct** (Université de Franche-Comté).

Expertise

Privacy	• Conception and application of global, shuffle, and local differential privacy protocols for statistical learning. • Application of syntactic anonymization methods for privacy-preserving data publishing. • Development of machine learning models with differential privacy guarantees.
Machine Learning	• Development of machine learning and deep learning methods for regression and time series forecasting tasks. • Development of machine learning and deep learning methods for classification (binary, multiclass, and multi-output) tasks.
Control System	• Design and implementation of closed-loop linear and nonlinear control methods. • Identification of linear and nonlinear systems with mathematical and black-box methods.
Optimization	• Development and utilization of linear and metaheuristic optimization methods.
Biomedical	• Conducting practical rehabilitation experiments on people with spinal cord injury through automatized methods.

Tools

Programming languages:	Python, Matlab & Simulink, Java, Visual Basic.
Libraries:	Keras, TensorFlow, TensorFlow Privacy, PyTorch, Scikit-Learn, Matplotlib, Pandas, Numpy, GEKKO, Scipy, Sympy, Ray, Numba, Scikit-fuzzy.
Operating Systems:	Linux (Debian and Ubuntu) and Windows 7/10.
Others:	MySQL, ARX anonymization tool, Labview, Latex, Sun Grid Engine (SGE), MS Office, AutoCAD, AltoQI Lumine, Multisim.

Languages

Portuguese	Mother Tongue

English	Advanced - C1
French	Intermediate - B2
Spanish	Intermediate - B2