Guillem HURAULT | Data Scientist

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French • UK Settled Status

Data Scientist with a **PhD in Statistical Machine Learning** for medical applications. Deep expertise in **Bayesian modelling** and **time-series forecasting**. Highly proficient with the **R** programming language and conscious about reproducible coding practices. Hands-on experience in managing research projects.

Professional Experience

Sept. 2022 – Today
Data Scientist, *Pythia Sports*, London, UK
Developed and conducted statistical analysis of predictive models for a sports betting pipeline.

Oct. 2017 – Sept. 2022
Imperial College London (Department of Bioengineering), UK
Research Associate (Jun. 2022 - Sept. 2022)
Research Assistant (Oct. 2017 - May 2022)

- Pioneered research on eczema for 1) detecting and assessing eczema in camera images using CNN, 2) predicting the evolution of eczema severity, 3) generating personalised treatment recommendations.
- Analysed real-world and clinical trial patient data with state-of-the-art Bayesian models for time-series forecasting.
- Published 10+ scientific articles to clinical and machine learning audiences. Presented work at international conferences. Reviewed several research papers.
- Developed software packages (EczemaPred, Hurformer Misc) and high-quality analysis code following agile and reproducible research practices (version control, documentation, testing, continuous integration).
- Supervised 25+ student projects on topics like statistical modelling, computer vision, clustering, Gaussian Processes.

2019 – 2021
Teaching Assistant, *Imperial College London (Department of Bioengineering)*, UK, part-time
Probability & Statistics ○ Mathematics ○ Occasional teaching in Machine Learning and Brain Machine Interfaces.

May 2016 –July 2016
Research Intern, *Laboratoire de Neurosciences Cognitives (CNRS UMR 7291), Aix-Marseille Université*, France
Analysed fMRI images using Machine Learning to understand the role of the oculomotor cortex in social perception.

Education

2018–2022
PhD in Statistical Machine Learning, *Imperial College London (Department of Bioengineering)*, UK
Thesis: Towards a data-driven personalised management of Atopic Dermatitis severity. Supervisor: Dr. Tanaka.

2016–2017
MSc in Biomedical Engineering, Neurotechnology, *Imperial College London*, UK, Distinction

2014–2018
Master's Degree in Engineering, *Ecole Centrale de Lyon*, one of France's top engineering schools

2014–2016
Bachelor's Degree in Economics, *Université Lyon 2*, France

2012-2014
Intensive preparation in Maths and Physics (MPSI, MP*) for the highly competitive entrance exams to the French "Grandes Écoles" at *Lycée Chateaubriand*, Rennes (France).

Skills

Languages
○ Native **French** ○ Fluent **English** ○ Basic Portuguese

Data Science
○ Machine Learning ○ Statistics ○ Bayesian modelling ○ Time-series forecasting ○ Uncertainty quantification ○ Visualisation ○ Missing values ○ Regularisation ○ Decision-making ○ Clustering ○ Causality

Programming
Working knowledge: ○ R (incl. tidyverse, Shiny, package development) ○ Python ○ Stan ○ LaTeX ○ RegEx ○ Git/GitHub

Basic knowledge: ○ MATLAB ○ SQL ○ C# (incl. Infer.NET) ○ Docker ○ HTML ○ Tableau

Software
○ Microsoft Office (incl. Publisher) ○ Microsoft Visual Studio ○ Adobe Premiere ○ Gimp

Other Experiences

2019 – 2021 **Bioengineering PhD representative**, *Imperial College London*

Represented 200+ PhD researchers in departmental meetings, organised social and professional events.

2014-2017 **Engineering student**

- Investigated the evolution of eczema using Machine Learning methods in the Biological Control Systems Lab.
- Designed a genetic algorithm in a research project with LIRIS Lab (CNRS) to solve a scheduling problem.
- Supervised a 6-person team for HEXADRONE to design and test a security system to avoid the crash of a drone.

2015 **General Secretary**, *Forum Perspectives*

Organized a yearly career fair with 100 companies, 2000 students participating and a turnover of 250k€.

2015 **Treasurer, Communication coordinator and Editor** of Centrale Lyon's newspaper Piston Hebdo.

2015 Active committee member of Centrale Lyon's Cinema Society.

Publications

[1] R. Attar, **G. Hurault**, Z. Wang, R. Mokhtari, K. Pan, B. Olabi, E. Earp, L. Steele, H. C. Williams and R. J. Tanaka, "Reliable detection of eczema areas for fully automated assessment of eczema severity from digital camera images", *MedRxiv*, 2022

[2] **G. Hurault**, K. Pan, R. Mokhtari, B. Olabi, E. Earp, L. Steele, H. C. Williams and R. J. Tanaka, "Detecting eczema areas in digital images: an impossible task?", *JID Innovations*, vol. 2, no. 5, p. 100133, 2022

[3] S. Haider, S. Fontanella, A. Ullah, S. Turner, A. Simpson, G. Roberts, C. S. Murray, J. W. Holloway, J. A. Curtin, P. Cullinan, S. H. Arshad, **G. Hurault**, R. Granell, A. Custovic, on behalf of STELAR/UNICORN11 investigators "Evolution of Eczema, Wheeze and Rhinitis from Infancy to Early Adulthood: Four Birth Cohort Studies", *American Journal of Respiratory and Critical Care Medicine*, vol. 206, no. 8, p. 950-960, 2022

[4] **G. Hurault**, J-F Stalder, S. Mery, A. Delarue, M. Saint Aroma, G. Josse and R. J. Tanaka, "EczemaPred: A computational framework for personalised prediction of eczema severity dynamics", *Clinical and Translational Allergy*, vol. 12, no. 3, p. e12140, 2022.

[5] **G. Hurault**, E. Roekevisch, M.E. Schram, K. Szegedi, S. Kezic, M.A. Middelkamp-Hup, P.I. Spuls and R. J. Tanaka, "Can serum biomarkers predict the outcome of systemic immunosuppressive therapy in adult atopic dermatitis patients?", *Skin and Health Disease*, vol. 2, no. 1, p. e77, 2022.

[6] **G. Hurault**, V. Delorieux, Y-M. Kim, K. Ahn, H. C. Williams and R. J. Tanaka, "Impact of environmental factors in predicting daily severity scores of atopic dermatitis", *Clinical and Translational Allergy*, vol. 11, no. 2, 2021.

[7] J. G. Holm, **G. Hurault**, T. Agner, M.L. Clausen, S. Kezic, R. J. Tanaka, S. F. Thomsen, "Immunoinflammatory Biomarkers in Serum Are Associated with Disease Severity in Atopic Dermatitis", *Dermatology*, vol. 237, no. 4, pp. 513–520, 2021.

[8] R. Jurakic Toncic, I. Jakasa, Y. Sun, **G. Hurault**, S. Ljubojevic Hadzavdic, R. J. Tanaka, B. Pavicic, A. Balic, K. Zuzul, M. Petkovic, S. Kezic and B. Marinovic, "Stratum corneum markers of innate and T helper cell-related immunity and their relation to the disease severity in Croatian patients with atopic dermatitis", *Journal of the European Academy of Dermatology & Venereology*, vol. 35, no. 5, pp. 1186–1196, 2021.

[9] K. Pan, **G. Hurault**, K. Arulkumaran, H. C. Williams and R. J. Tanaka, "EczemaNet: Automating Detection and Assessment of Atopic Dermatitis", *International Workshop on Machine Learning in Medical Imaging*, 2020.

[10] **G. Hurault**, E. Domínguez-Hüttinger, S. M. Langan, H. C. Williams and R. J. Tanaka, "Personalised prediction of daily eczema severity scores using a mechanistic machine learning model", *Clinical & Experimental Allergy*, vol. 50, no. 11, pp. 1258–1266, 2020.

[11] J. Nousbeck, M.A. McAleer, **G. Hurault**, E. Kenny, K. Harte, S. Kezic, R. J. Tanaka and A.D. Irvine, "miRNA analysis of Childhood Atopic Dermatitis reveals a role for miR-451a" *British Journal of Dermatology*, vol. 184, no. 3, pp. 514–523, 2020.

[12] M.A. McAleer, I. Jakasa, **G. Hurault**, P. Sarvari, W. H. I. McLean, R. J. Tanaka, S. Kezic and A. D. Irvine, "Systemic and stratum corneum biomarkers of severity in infant AD include markers of innate and Th-related immunity and angiogenesis", *British Journal of Dermatology*, vol. 180, no. 3, pp. 586–596, 2019.

[13] **G. Hurault**, M. Schram, E. Roekevisch, P. I. Spuls and R. J. Tanaka, "Relationship and probabilistic stratification of EASI and oSCORAD severity scores for atopic dermatitis", *British Journal of Dermatology*, vol. 179, no. 4, pp. 1003-1005, 2018.

Public speaking

[1] "Applications of Machine Learning in medical research", presented at QuanTII Summer Workshop, 2022

[2] "Making the most of eczema data for prediction, inference and treatment recommendation", poster presented at Towards the future of AI, 2022

[3] "Computational tools for data-driven personalised medicine for Atopic Dermatitis", poster presented at the International Symposium on Atopic Dermatitis, 2021

[4] "A Bayesian Hidden Markov model to predict the dynamic evolution of disease severity in eczema", poster presented at the International Conference on Systems Biology of Human Diseases, 2019

[5] "Bayesian Modelling to Predict the Evolution of Eczema Severity", poster presented at the International Conference on Systems Biology, 2018.

[6] "Bayesian Machine Learning to Predict Short-term Course of Eczema Severity", presented at BioMedEng18, 2018

[7] "Predicting short- and long-term outcomes of a systemic therapy for atopic dermatitis using machine learning methods", presented at the International Symposium on Atopic Dermatitis, 2018

[8] "How can Machine Learning help our understanding of Atopic Dermatitis?", presented at the London Skin Club, 2017