Elvis Dohmatob, PhD.

Senior Researcher, Criteo AI Lab

32 rue Blanche, 75009 Paris, France.
gmdopp@gmail.com
dohmatob.github.io
Date of birth: 27 April 1987

Research statement

Context.
In recent times, machine learning / AI systems demonstrated human-level ability in many domains previously thought to be out of reach: computer vision, natural language processing, generative modeling, recommnder systems, fault prediction, fraud prediction, medical diagnosis, complex games like Go, just to name a few. However, the underlying principles governing these data-driven techniques are still elusive. Understanding the failure modes is even more challenging. For example, adversarial examples in deep-learning models remain a mystery. Also, if care is not taken, ML / AI powered-systems can amplify problems linked to faireness and privacy. *Explanability*, *Fairness*, and *Privacy*, have been identified by researchers and practictionals alike, as being part of the biggest foundational problems in machine learning and AI. These three problems are different facets of the the same thing.

My research agenda, now, and the future.
My research focuses on the following subjects (also see selected publications below):
- *Adversarial robustness* (theoretical limits, detection)
- *Robust optimization* (robustness to uncertainty like distributional shift)
- *Structured prediction* (specifically, determinant point processes)
- *Understanding deep-learning* (optimization, generalization)

Recently, I have also had significant interest in certain aspects of reinforcement learning (risk-averseness, approximation algorithms, etc.). The subjects listed above all have tight links with explanability, fairness, and privacy in machine learning / AI discussed above. Moving on, my longterm goal is to continue to make scientific contributions that help our understanding of these problems.

Education

Oct 2014 – Sep 2017 **Doctor of Philosophy (PhD.), Computer Science**, *Université Paris-Saclay*.
Title: Enhancement of functional brain connectome analysis by the use of deformable models in the estimation of spatial decompositions of the brain images.
Supervisors: Bertrand THIRION, PhD; Gael VAROQUAUX, PhD.

2010 – 2011 **MSc. Cryptology and Information Security**, *University of Bordeaux 1*.

2009 – 2010 **Maîtrise ès Mathématiques**, *University of Bordeaux 1*.

2005 – 2008 **BSc. Mathematics and Computer Science**, *University of Buea*.

Professional experience

March 2018 – Present **Senior researcher**, *Criteo AI Lab, Paris, France*.
- Mostly working on: adversarial examples, deep-learning theory, robust optimization, structured prediction, reinforcement-learning
- Co-supervising Masters' and PhD students (CIFRE)

Oct 2017 – Dec 2017 **Post-doctoral researcher**, *Parietal Team – INRIA / CEA, Neurospin, Neurospin, Université Paris-Saclay, France*.
Machine learning and neuroscience

Oct 2014 – Sep 2017 **Part-time research engineer**, *Parietal Team – INRIA / CEA, Neurospin, Neurospin, Université Paris-Saclay, France*.
While preparing my PhD, a 6th of my time is spent programming and consulting.

Oct 2012 – Oct 2014 **Research engineer**, *Parietal Team – INRIA / CEA, Neurospin, Neurospin, Université Paris-Saclay, France.*
Software engineering / python-programming; implementation of machine learning algorithms for brain decoding (on functional MRI data); preprocessing and statistical analysis of fMRI data; implementation of registration algorithms. See http://nilearn.github.io/search.html?q=dohmatob and https://github.com/neurospin/pypreprocess.

Mar 2011 – Aug 2011 **Cryptology and Security intern**, *P1 Security*, Paris, France.
Implementation of an event-driven pentesting framework for telecom protocols

Selected scientific publications

Summary from Google scholar: Total citations $\geq$ 553; h index $\geq$ 10; 110 index $\geq$ 12.
Full information available at: https://scholar.google.fr/citations?user=FDWgJY8AAAAJ&hl=fr.

2020
- *On the Convergence of Smooth Regularized Approximate Value Iteration Schemes.* Neural Information Processing Systems (NeurIPS).
- *Learning disconnected manifolds: a no GAN's land.* International Conference in Machine Learning (ICML). https://arxiv.org/pdf/2006.04596.pdf
- *Distributionally Robust Counterfactual Risk Minimization.* Conference on Artificial Intelligence (AAAI). https://arxiv.org/abs/1906.06211
- *Dark control: The default mode network as a reinforcement learning agent.* Human Brain Mapping (HBM). https://onlinelibrary.wiley.com/doi/full/10.1002/hbm.25019

2019
- *Generalized No Free Lunch Theorem for Adversarial Robustness.* International Conference in Machine Learning (ICML). https://arxiv.org/pdf/1810.04065.pdf
- *Learning Nonsymmetric Determinantal Point Processes.* Advanced Neural Information Processing Systems – NeurIPS conference (NeuRIPS). https://arxiv.org/pdf/1905.12962.pdf

Scientific reviewing

2016 – present NeurIPS – Neural Information Processing Systems
2018 – present ICML – International Conference in Machine Learning
2019 – present COLT – Conference on Learning Theory
2019 – present ICLR – International Conference on Learning Representation
2019 – present IJCAI – International Joint Conference on Artificial Intelligence

Supervision of students

Jan. 2019 – July 2019 Morgan Goibert, Masters' internship
Nov. 2019 – present Morgan Goibert, PhD candidate (co-supervised with Stéphan Clémançon)

Languages

Bilingual English (fluent), French (fluent)

Contributions to open-source software projects

Data science & AI scikit-learn http://scikit-learn.org/stable/
Complete list See complete list on my github profile at https://github.com/dohmatob

IT and computing skills

See my github profile at https://github.com/dohmatob
Programming Languages Python, bash, Latex

Data science software	scikit-learn, pandas, pytorch, keras
Software Engineering	OOP, TDD, version control (git, github), continuous integration (travis, circle-ci), parallel computing (xargs, joblib)
Operating Systems	GNU/Linux

Scholarships

2009 - 2011	Erasmus Mundus, ALGANT (*Algebra, Geometry, and Number Theory*), Université de Bordeaux 1

Interests

Research	adversarial examples, deep-learning theory, robust optimization, privacy / fairness
Hobbies	programming, dancing, ping-pong, arcade games