

Mohamed Hebiri

Professional address

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Education

- 2021 **Habilitation à Diriger des Recherches** in Mathematical Statistics - Université Gustave Eiffel; Laboratoire d'analyse et de mathématiques appliquées (LAMA).
- 2005 – 2009 **Ph.D in Mathematical Statistics** - Université Paris Diderot - Paris 7; Laboratoire de Probabilités et Modèles Aléatoires (LPMA).
- 2004 – 2005 **Master in Random Modelling and Statistics** - Université Denis Diderot - Paris 7.
- 2000 – 2004 **BS in Mathematics** - Université Pierre et Marie Curie - Paris 6.

Experience

- Since 2019 **Lecturer in ENSAE-CREST**. *Course : Applied Statistical Learning.*
- June 2017 **Invited Lecturer** - University of Washington. *Summer Course : Prediction in High Dimensions.*
- Since 2010 **Maître de Conférences** - Université Gustave Eiffel.
- 2009 – 2010 **PostDoc** with Sara Van de Geer - ETH (Eidgenössische Technische Hochschule) - Zürich.
- 2008 – 2009 **ATER** - Université Paris Diderot-Paris 7.
- 2005 – 2008 **Teaching assistant** - Université Paris-Est Marne-La-Vallée.

Teaching

- Course for PhD Students Summer Course on *Prediction in High-Dimensions* – University of Washington.
- Graduate courses *Machine-Learning* – Université Gustave Eiffel;
High dimensional statistics – Université Gustave Eiffel;
Non-parametric statistics – Université Gustave Eiffel;
Applied Statistical Learning – ENSAE-CREST.
Statistical inference – Université Gustave Eiffel;
Data Analysis with SAS – Université Gustave Eiffel;
- Undergraduate courses Various lectures on *Linear Algebra*, *Real Analysis*, and *Probability* – Université Gustave Eiffel and Université Paris Diderot–Paris 7.

PhD Students

- Since 2018 **Ahmed Zaoui** : Applications of optimal transport in Machine Learning. *Co-advised with Christophe Denis and Romuald Elie.*
- 2016-2019 **Evgenii Chzhen** (Now PostDoc at Paris Saclay – INRIA) : Plug-in Approaches for classification. *Co-advised with Joseph Salmon.*

Graduate students supervision and PhD jury

- PhD defense jury Edwin Grappin, 2018 – *Advisor : Arnak Dalalyan.*
- Supervision of Richard Vin – Mohamed Rabi Ali Youssouf – Evgenii Chzhen – Viktoriia Oliinyk
Master students – Bassirou Mboup – Virgile Amato – Ahmed Zaoui – Mohammed Habbal – Tall Zakaria.

Seminar organization

- Since 2020 With C. Tran, we are organizing a bi-weekly seminar on statistic in Université Gustave Eiffel.
- 2019 I ran a seminar in the statistical team of LAMA laboratory (Université Gustave Eiffel) on the book *Introductory lectures on convex optimization* by Yurii Nesterov.
- 2013 – 2018 With M. Fradelizi and M. Martinez, we have organized the weakly seminar “probability, statistics, and their applications (ASPRO)” in Université Paris-Est – Marne-la-Vallée (newly Gustave Eiffel).

Conferences organization

- December 2020 Session in CMStatistics Conference (ERCIM 2020) on **Algorithmic fairness with statistical guarantees** - University of London (virtual), UK.
- December 2019 Session in CMStatistics Conference (ERCIM 2019) on **Set-valued classification** - University of London, UK.
- 2012 – 2019 Committee member – **1st to 4th** and **6th to 8th** *Conformal Prediction and its Applications (COPA)* Workshops (several cities).
- 22–24 June 2011 Committee member – Statistics and Modeling for Complex Data. École des Ponts Paris-Tech.

Research interests

- Machine learning* Algorithmic fairness ; set-valued classification ; semi-supervised methods ; Multi-class and multi-label classification ; classification with reject option
- High-dimensional statistic* Lasso-type methods ; optimality of tuning parameters ; Transductive approaches
- On-line learning* Active learning ; Conformal Prediction ; On-line Prediction

List of publications

- 2021 **Minimax set-valued approaches for multi-class classification**, with Evgenii Chzhen and Christophe Denis. *Accepted in Bernoulli*.
- 2020 **Regression with reject option and application to kNN**, with Christophe Denis and Ahmed Zaoui. *Proceedings of Thirty-third Conference on Neural Information Processing Systems (NeurIPS)*.
- Fair Regression with Wasserstein Barycenters**, with Evgenii Chzhen, Christophe Denis, Luca Oneto, and Massimiliano Pontil. *Proceedings of Thirty-third Conference on Neural Information Processing Systems (NeurIPS)*.
- Fair Regression via Plug-in Estimator and Recalibration With Statistical Guarantees**, with Evgenii Chzhen, Christophe Denis, Luca Oneto, and Massimiliano Pontil. *Proceedings of Thirty-third Conference on Neural Information Processing Systems (NeurIPS)*.
- Consistency of plug-in confidence sets for classification in semi-supervised learning**, with Christophe Denis. *Journal of Nonparametric Statistics*, vol. 32(1), pp. 42-72.
- 2019 **Leveraging labeled and unlabeled data for consistent fair binary classification**, with Evgenii Chzhen, Christophe Denis, Luca Oneto, and Massimiliano Pontil. *Proceedings of Thirty-third Conference on Neural Information Processing Systems (NeurIPS)*.
- On Lasso refitting strategies**, with Evgenii Chzhen and Joseph Salmon. *Bernoulli*, vol. 25(4A), pp. 3175-3200.
- 2017 **Confidence sets with expected sizes for Multiclass Classification**, with Christophe Denis. *Journal of Machine Learning Research*, vol. 18(102), pp. 1-28.
- On the Prediction Performance of the Lasso**, with Arnak Dalalyan and Johannes Lederer. *Bernoulli*, vol. 23(1), pp. 552-581.
- 2013 **Learning Heteroscedastic Models by Convex Programming under Group Sparsity**, with Arnak Dalalyan, Katia Meziani, and Joseph Salmon. *Proceedings of the International Conference on Machine Learning (ICML)*.
- Rank penalized estimation of a quantum system**, with Pierre Alquier, Cristina Butucea, and Katia Meziani. *Physical Review A*, vol. 88(3).
- How Correlations Influence Lasso Prediction**, with Johannes Lederer. *IEEE, Transactions on Information Theory*, vol. 59(3), pp. 1846-1854.
- 2012 **Transductive versions of the LASSO and the Dantzig Selector**, with Pierre Alquier. *Journal of Statistical Planning and Inference*, vol. 142(9), pp. 2485-2500.
- 2011 **Transductive versions of the LASSO and the Dantzig Selector**, with Pierre Alquier. *Statistics and Probability Letters*, vol. 81, pp. 1760-1765.
- The Smooth-Lasso and other $\ell_1 + \ell_2$ -regularized methods**, with Sara van de Geer. *Electronic Journal of Statistics*, Vol. 5, pp. 1184-1226;
Other asymptotic results in : **Regularization with the Smooth-Lasso procedure**, 2008.
- 2010 **Sparse Conformal Predictors**. *Statistics and Computing*, Vol. 20, Issue 2, pp. 253-266.
- 2008 **Some theoretical results on the Grouped Variables Lasso**, with Christophe Chesneau. *Mathematical Methods of Statistics*, Vol. 17, No. 4, pp. 317-326.

Preprints and manuscripts

- 2020 **Layer Sparsity in Neural Networks**, with Johannes Lederer. *Submitted*.
- 2017 **On the benefits of output sparsity for multi-label classification**, with Evgenii Chzhen, Christophe Denis, and Joseph Salmon. *Preprint*.
- 2014 **Aggregation for Linear Inverse Problems**, with Jean-Michel Loubes and Paul Rochet. *Submitted*.

Thesis

- 2009 **Ph.D. in Mathematical Statistics** : Some variable selection methods based on the LASSO estimator – Univ. Paris Diderot-Paris 7. *Advisor* : Nicolas Vayatis.
Jury members : Francis Bach (reviewer) – Stéphane Canu – Arnak Dalalyan – Dominique Picard – Alexandre Tsybakov – Sara van de Geer (reviewer) – Nicolas Vayatis.

Habilitation à Diriger des Recherches

- 2009 **HDR in Mathematical Statistics** : Some contributions to high-dimensional statistics and learning with desired properties – Univ. Gustave Eiffel.
Reviewers : Florentina Bunea – Antoine Chambaz – Gábor Lugosi
Jury members : Sylvain Arlot – Antoine Chambaz – Arnak Dalalyan – Claire Lacour – Florence Merlevède – Alexandre Tsybakov – Nicolas Vayatis.

Reviewing task

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| Journals | Annals of Statistics (AoS) – Journal of the American Statistical Association (JASA) – Bernoulli – Biometrika – IEEE Transaction on Information Theory – Journal of Machine Learning Research (JMLR) – Electronic Journal of Statistics (EJS) – Journal of the Royal Statistical Society : Series B (JRSS B). |
| Conferences | Neural Information Processing Systems (NeurIPS) – International Conference on Machine Learning (ICML) – Artificial Intelligence and Statistics (AISTATS). |

Faculty responsibilities

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| 2012-2016 | Member of the selection committee for assistant positions in Université Paris-Est – Marne-la-Vallée (newly Gustave Eiffel). |
| Since 2018 | Member of the mathematical department council in Université Gustave Eiffel. |
| Since 2018 | Member of the scientific council in LAMA laboratory in Université Gustave Eiffel. |
| 2013 and 2015 | Member of the selection committee for a Probability-Statistic “Maîtres de Conférences” position in Université Paris-Nanterre. |

Selected invited talks

- December 2008 • **Seminar “Learning and Sparsity”**, CREST, ENSAE - Paris.
- May 2009 • **Bi-weekly learning seminar**, Ecole Normale Supérieure (ENS - Paris).
- December 2009 • **Mathematical Statistics with Applications in Mind 9**, CIRM, Marseille.
- December 2010 • **Seminar für Statistik**, ETH - Zürich – Switzerland.
- May 2011 • **Conference : 43-th Days of Statistics (SFDS)**, Tunis.
- July 2011 • **Conference : Foundations of Computational Mathematics**, Budapest – Hungary.
- June 2013 • **Seminar of Statistic of Orsay**, Université Paris-Sud 11.
- June 2013 • **Poster session in ICML**, Atlanta – USA.
- April 2015 • **Conformal Prediction and its Applications (COPA 2015 Workshop)**, Royal Holloway, University of London, Egham, Surrey, UK.
- June 2017 • **Washington University**, Seattle – USA.
- January 2018 • **Seminar ASPRo : Series a 2 hours lectures on *statistical learning***, Université Paris-Est – Marne-la-Vallée (newly Gustave Eiffel).
- December 2018 • **CMStatistics conference (ERCIM 2018)**, Pisa – Italy.
- April 2019 • **Ruhr-University of Bochum**, Germany.
- September 2019 • **IHP Seminar**, Institut Henri Poincaré – Paris.
- December 2019 • **Poster session in NeurIPS**, Vancouver – Canada.
- December 2020 • **3 Poster sessions and 1 Oral in NeurIPS**, Virtual conference; Vancouver – Canada.

Miscellaneous

Languages French : mother tongue.
Arabic : bilingual.
English : fluent.
German : basic level.

Interests and hobbies Football; Capoeira; Swimming; Cinema; Music; Travelling.