# Yassine Laguel

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CONTACT INFORMATION

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RESEARCH INTERESTS

My interests center around optimization under uncertainty and its applications in stochastic programming and machine learning. A common thread in my research is the design and analysis of numerical algorithms to address risk in data-driven applications. I draw and extend ideas and tools from convex optimization, probability theory and numerical analysis while keeping an *operational* approach, with a balance between theoretical and practical contributions.

ACADEMIC POSITIONS

**Princeton University**,                                                    Aug 2022 - Present
Departmental Guest at the Center for Statistics and Machine Learning (CSML).
Princeton, USA.

**Rutgers University**,                      Jan 2022 - Present
Postdoctoral Associate at the Department of Management Sciences and Information Systems (MSIS), hosted by Prof. Mert Gürbüzbalaban.
New Brunswick, USA.

EDUCATION

**Ph.D. in Optimization and Machine Learning**,            Oct 2018 - Nov 2021

Supervised by Jérôme Malick, Université Grenoble Alpes, Grenoble, France.

**B.S., M.S. in Computer Sciences and Applied Mathematics**      Sep 2015 - Sep 2018

Diplôme d'ingénieur from ENSIMAG, Grenoble France.

**B.S., M.S. in Mathematics**                 Sep 2015 - Sep 2018

Master major in statistics, Université Grenoble Alpes, Grenoble, France. Degrees pursued in parallel to my diplôme d'ingénieur.

JOURNAL PAPERS

[1] **Yassine Laguel**, Mert Gürbüzbalaban, Necdet Serhat Aybat. A risk-averse perspective on acceleration for saddle point problems (Tentative title). *In preparation*.

[2] Yu-Guan Hsieh, **Yassine Laguel**, Franck Iutzeler, Jérôme Malick. Push–pull with device sampling. *IEEE Transactions in Automatic Control*. 2022. Under review.

[3] **Yassine Laguel**, Krishna Pillutla, Jérôme Malick, Zaid Harchaoui. Federated learning with heterogeneous data: a superquantile optimization approach. *Machine Learning Journal*. 2022. Under review.

[4] **Yassine Laguel**, Wim Van Ackooij, Jérôme Malick. Chance constrained problems: a bilevel convex optimization perspective. *Computational Optimization and Applications*. 2022. Under review.

[5] **Yassine Laguel**. Risk-averse optimization: models, algorithms, and applications in machine learning. *PhD. Manuscript*. 2022.

[6] **Yassine Laguel**, Jérôme Malick, Zaid Harchaoui. Superquantile-based learning: a direct approach using gradient-based optimization. *Journal of Signal Processing Systems*. No. 94, pages 161–177. 2022. https://yassine-laguel.github.io/files/2021_jsps.pdf

[7] **Yassine Laguel**, Wim Van Ackooij, Jérôme Malick, Guilherme Matiussi Ramalho. On the convexity of level-sets of probability functions. *Journal of Convex Analysis*. No. 29.2, pages 411-442. 2022. https://yassine-laguel.github.io/files/transconcavity-paper.pdf

[8] **Yassine Laguel**, Krishna Pillutla, Jérôme Malick, Zaid Harchaoui. Superquantiles at work: machine learning applications and efficient (sub)gradient computation. *Set-Valued and Variational Analysis*. No. 29, pages 967–996. 2022. https://yassine-laguel.github.io/files/svaa-paper.pdf.

[9] Gilles Bareilles, **Yassine Laguel**, Dmitry Grishchenko, Franck Iutzeler, Jerome Malick. Randomized progressive hedging methods for multi-stage stochastic programming. *Annals of Operations Research*. No. 295, pages 535–560. 2020. https://arxiv.org/abs/2009.12186

CONFERENCE PAPERS

[10] **Yassine Laguel**, Krishna Pillutla, Jérôme Malick, Zaid Harchaoui. Device heterogeneity in federated learning: a superquantile approach. *Proceedings of the $55^{th}$ Annual Conference on Information Sciences and Systems (CISS 2021)*. https://arxiv.org/abs/2002.11223

[11] **Yassine Laguel**, Jérôme Malick, Zaid Harchaoui. First order optimization for superquantile-based supervised learning.*Proceedings of the Machine Learning and Signal Processing Conference (MLSP 2020) - Best Student Paper Award*. https://arxiv.org/abs/2009.14575

SOFTWARE

**TACO** 2022

Python toolbox for chance constrained optimization. Yassine Laguel, Wim Van Ackooij, Jérôme Malick. https://yassine-laguel.github.io/taco/.

**SPQR** 2020

Python toolbox for superquantile minimization. Yassine Laguel, Jérôme Malick, Zaid Harchaoui. https://yassine-laguel.github.io/spqr/.

**RandomizedProgressiveHedging.jl** 2019

Julia toolbox for solving multistage stochastic problems by randomized versions of the progressive hedging algorithm. Gilles Bareilles, Yassine Laguel, Dmitry Grishchenko, Franck Iutzeler, Jerome Malick. https://yassine-laguel.github.io/RandomizedProgressiveHedging.jl/stable.

INVITED TALKS

**On the acceleration/robustness trade-off for stochastic min-max problems**
- INFORMS annual meeting 2022
  A robust perspective on acceleration for saddle point problems
  *Talk*. Indianapolis, USA.
- International conference on continuous optimization (ICCOPT) 2022
  New perspectives on robustness via the Conditional Value at Risk.
  *Talk*. Lehigh, USA.

**Handling statistical heterogeneity in federated learning**
- Magnet Seminar 2022
  Federated learning with heterogeneous data: a superquantile optimization approach.
  *Talk*. Inria Lille, France.
- University of Washington Machine Learning Seminar 2022
  Convex risk measures : models, algorithms and applications in federated learning.
  *Talk*. Seattle, USA.
- Thoth Seminar 2022
  Convex risk measures : models, algorithms and applications in federated learning.
  *Talk*. Inria Grenoble, France.

- Journées des Statistiques                                                              2021
    Risk-sensitive learning for heterogeneous frameworks.
    *Talk*. Nice, France.
- Workshop on Communication Efficient Distributed Optimization                            2021
    Device heterogeneity in federated learning : a superquantile approach.
    *Poster* Online workshop.
- Federated Learning One World Seminar                                                    2020
    Device heterogeneity in federated learning : a superquantile approach.
    *Talk*. Online Seminar.
    https://www.youtube.com/watch?v=W-oNzU04Y8I
- Optimization for Machine Learning Conference                                            2020
    Handling device heterogeneity in federated learning.
    *Poster*. Marseille, France.

**PhD. Defense**                                                                          2021
    Risk-averse optimization: models, algorithms, and applications in machine learning.
    *Talk*. Grenoble, France.

**Hidden convexity in probabilistic programming**
- ANSI Seminar                                                                            2021
    On hidden convexity in chance constrained problems.
    *Talk*. Los Alamos, USA.
- SMAI-MODE Conference                                                                    2020
    A DC approach for chance constraints.
    *Talk*. Saclay, France.
    https://www.youtube.com/watch?v=KB3sV-trEy4&list
- International conference on continuous optimization (ICCOPT)                             2019
    On the interplay between generalized concavity and chance constraints.
    *Talk*. Berlin, Germany.

**Efficient oracles for distributionally robust optimization**
- IFDS Workshop on Distributional Robustness in Data Science                              2022
    SPQR : A Toolbox for Superquantile-based Learning
    *Talk*. Seattle, USA.
- Machine Learning and Signal Processing Conference (MLSP)                                 2020
    First-order optimization for superquantile-based supervised learning.
    Best student Paper Award. *Talk*. Espoo, Finland.
    https://www.youtube.com/watch?v=JRWvWxOxRiQ
- ROADEF                                                                                  2020
    Practical minimization of CVar-based risk functions.
    *Talk*. Montpellier, France.
- International conference on stochastic programming (ICSP)                                2019
    $1^{st}$-order methods for minimization of superquantile-based risk measures.
    *Talk*. Trondheim, Norway.

**Instructor**

- Fundamentals of analysis and algebra.                                                   50h.
    Grenoble INP. *Undergraduate Course*. Grenoble, France.
- Fundamentals of analysis and algebra.                                                   50h.
    Unversité Grenoble Alpes. *Undergraduate Course*. Grenoble, France.
- Introduction to R.                                                                     2x30h.
    Université Grenoble Alpes. *Undergraduate Course*. Grenoble, France.
- Introduction to Python.                                                                2x30h.
    Université Grenoble Alpes. *Graduate Course*. Grenoble, France.

- Convex and distributed optimization.                                                     18h.
  Université Grenoble Alpes. *Graduate Course*. Grenoble, France.
- Numerical optimization.                                                                   25h.
  ENSIMAG. *Graduate Course*. Grenoble, France.

**Guest Lecturer**

- Distributionally robust machine learning.                                                 4h.
  University of Washington. *Graduate Course*. Seattle, USA.
- Introduction to federated learning.                                                       1.5h.
  ENSIMAG. *Graduate Course*. Grenoble, France.

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<tr><td>PROFESSIONAL<br>SERVICE</td><td>

**Committee Service**
- Founder and Organizer of the Optim & ML Seminar at Rutgers University, since March 2022.
- Founder and Organizer of GORGeous (Grenoble Optimization Reading Group), at the Université Grenoble Alpes, from Sep. 2019 to Oct. 2021.
  https://sites.google.com/view/gorgeous-optim/
- Jury member for the International Tournament of Young Mathematicians (ITYM). Iasi, Romania. 2013.

**Referee Service**
- *Journal of Machine Learning Research (JMLR)*
- *Mathematics of Operations Research*
- *EURO Journal on Computational Optimization*
- *Automatica*
- *Optimization*
- *Journal of Optimization Theory and Applications (JOTA)*

**Conference Service**
- Program Committee : 51st International Conference on Parallel Processing (ICPP 2022).
- Organizer of the session *First-order methods for min-max problems* at ICCOPT 2022.
- Organizer of the session *First-order methods for minimax problems at INFORMS* 2022.

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PROFESSIONAL
EXPERIENCE

**Research Internships**
- University of Washington, Seattle, USA.                                                   2018
  Initiated the series of works [6, 8, 10, 11].
- EDF R&D, Saclay, France.                                                                  2017.
  Led to the publication of the journal paper [7].
- WeSave, Financial Startup in Paris, France.                                               2016
  Worked on the establishment of quantitative criterion based on random correlations matrices to predict crises.

**Consulting Activity**                                                                     2016
- Conception and development of a transport management software for an international firm.

AWARDS

**Best Student Paper Award**                                                                2020

Machine learning and signal processing conference (MLSP 2020).
Espoo, Finland.

**Finalist of the International Tournament of Young Mathematicians (ITYM)**                  2012

*Rank :* $3^{rd}$. Orsay, France.

**Winner of the french tournament of young mathematicians (TFJM)**                          2012

Saclay, France.