Yassine Laguel

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

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.

TEACHING EXPERIENCE

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.

PROFESSIONAL SERVICE

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. 2012.

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.

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.