

# Anas Barakat

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## EDUCATION

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<b>Institut Polytechnique de Paris, Télécom Paris, France</b> Ph.D. in Applied Mathematics (expected before december 2021) Advisors: Prof. Pascal Bianchi and Prof. Walid Hachem Thesis: Dynamical study of optimization algorithms in random environments	2018 - 2021
<b>Université Paris Saclay, France</b> M.Sc. in Data Science (with highest honors)	2017 - 2018
<b>Télécom Paris, France</b> Engineering Degree, M.Sc. in Applied Mathematics and Computer Science Machine Learning track Top 5% ranking in one of the top french engineering schools	2015 - 2018
<b>Lycée Stanislas, Paris, France</b> Classes préparatoires (equivalent to B.Sc. in Mathematics and Physics) Intensive courses of Mathematics and Physics leading to the nationwide highly competitive exam for admission to a graduate-level engineering school (“Grande Ecole”)	2013 - 2015

## PUBLICATIONS

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1. **Anas Barakat**, Pascal Bianchi and Julien Lehmann, “Analysis of a Target-Based Actor-Critic Algorithm with Linear Function Approximation.” *Under Review*, 2021.
2. **Anas Barakat**, Pascal Bianchi, Walid Hachem, and Sholom Schechtman, “Stochastic optimization with momentum: convergence, fluctuations, and traps avoidance.” In: *Electronic Journal of Statistics* 15 (2), 3892-3947, 2021.
3. **Anas Barakat** and Pascal Bianchi, “Convergence and Dynamical Behavior of the Adam Algorithm for Non-Convex Stochastic Optimization.” In: *SIAM Journal on Optimization* 31 (1), 244-274, 2021.
4. **Anas Barakat** and Pascal Bianchi, “Convergence Rates of a Momentum Algorithm with Bounded Adaptive Step Size for Nonconvex Optimization.” In: *Proceedings of The 12th Asian Conference on Machine Learning (ACML), PMLR vol.129, 225-240*, 2020.
5. **Anas Barakat** and Pascal Bianchi, “Convergence de l’algorithme Adam du point de vue des systèmes dynamiques.” In: *The 27th Francophone Colloquium of Signal and Image Processing (GRETSI)*, 2019.

## PRESENTATIONS

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### Scientific Talks

*Convergence and Dynamical Behavior of the ADAM Algorithm for Non-Convex Stochastic Optimization.*

- Invited Seminar: “Image, Optimization and Probabilities” research group  
Bordeaux Institute of Mathematics (IMB), Bordeaux, France Oct. 15th 2020
- 2nd Symposium on Machine Learning and Dynamical Systems  
Fields Institute for Research in Mathematical Sciences, online Sep. 21st 2020

- Mathematical Optimization and Decision (MODE) group days Sep. 7th 2020  
French Society of Applied and Industrial Mathematics (SMAI), online
  - Mathematics of Optimization and Applications (MOA) annual days Oct. 17th 2019  
National Institute of Applied Sciences (INSA), Rennes, France
- Convergence of the ADAM Algorithm from a Dynamical Systems Viewpoint.*
- Junior Conference on Data Science and Engineering Sep. 12th 2019  
Centrale Supélec, Gif-sur-Yvette, France
  - Francophone colloquium of Signal and Image Processing (GRETSI) Aug. 29th 2019  
Lille University, Lille, France

## Posters

- Convergence Analysis of a Momentum Algorithm with Adaptive Step Size for Non-convex Optimization.*
- 11th OPT Workshop on Optimization for Machine Learning Dec. 14th 2019  
Exchange Hotel Vancouver, Vancouver, Canada
- Convergence of the ADAM Algorithm from a Dynamical Systems Viewpoint.*
- International Workshop on Machine Learning and Artificial Intelligence Oct. 8th 2019  
Télécom Paris, Paris, France
  - Machine Learning in the Real World workshop Oct. 2nd 2019  
Criteo, Paris, France
  - International Conference on Continuous Optimization (ICCOPT) Aug. 5th 2019  
Technical University (TU) of Berlin, Berlin, Germany
  - Data Science Summer School (DS3) Jun. 24th 2019  
Ecole Polytechnique, Palaiseau, France

## WORK EXPERIENCE

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**Télécom Paris** 4/2018-9/2018  
Research internship  
Topic: Adaptive gradient algorithms for first-order optimization  
Supervisor: Prof. Pascal Bianchi  
Funding: French National Research Center (CNRS)

## ACADEMIC SERVICE

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Reviewer for IEEE Transactions on Image Processing journal

## TEACHING EXPERIENCE

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**Télécom Paris** 2018-2021  
Teaching assistant  
Conducted exercises sessions, gave few lectures, supervised lab sessions, evaluated students projects and graded final exams.

- Optimization for Machine Learning (SD-TSIA211) 2018-2021  
Instructors: Profs. Pascal Bianchi and Olivier Fercoq  
3 x 12 h, 32 master students
- Statistics (MDI220) 2018-2020  
2 x 8 h, 32 master students  
Instructors: Profs. Anne Sabourin and Pavlo Mozharovskyi

- Statistics: Linear Models (SD204) 2019-2020  
2 x 8 h, 32 master students  
Instructor: Prof. François Portier
- Probabilities (MDI104) 2018-2020  
21 h, 30 undergraduate students  
Instructor: Prof. Pascal Bianchi
- Machine Learning (MDI343-724) 2018-2019  
15 h, 120 Big Data specialized master students  
Instructors: Profs. Florence d'Alché Buc and Pavlo Mozharovskyi

## MENTORING EXPERIENCE

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- Co-supervision of a Master student research internship (Julien Lehmann) from May 2021
- Supervision of two Master students final research and innovation project 2018-2019  
6-months project of Yuqing Wang and Zhengkang Shi  
Collaboration: XLearn startup  
Topic: Development of an online job advising system  
Learning skill titles' from users' profiles using Machine Learning methods
- Tutoring undergraduate students in computer science (individually and group of 10) 2017-2018  
Design and Analysis of Algorithms (INF421), Advanced Programming (INF441)  
Ecole Polytechnique, Palaiseau, France

## AWARDS AND SCHOLARSHIPS

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- Dodu Prize 2020  
Best communication of a young researcher at the Optimization and Decision annual days,  
French Society of Applied and Industrial Mathematics (SMAI)  
Jury: M. Akian, P. Bich, J. Bolte, J-B. Caillaud, S. Gaubert, V. Leclerc,  
P. Mertikopoulos, F. Santambrogio (president of the jury), H. Zidani
- Ph.D funding 2018-2021  
Mines-Télécom Institute (IMT), Future & Disruptive technologies research program  
Awarded to top 5% students of Télécom Paris.
- Merit Scholarship 2015-2018  
Moroccan Ministry of Higher Education, Scientific Research and Professional Training  
Awarded to students in top french engineering and business schools.
- "Excellence-Major" scholarship 2013-2015  
Agency for French Education Abroad (AEFE)  
Awarded by the French Ministry for Europe and Foreign Affairs to top foreign (non french)  
students from french high schools all over the world for pursuing high-level studies in France

## COMPUTER SKILLS

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Python (scikit-learn, numpy, scipy, pandas, keras, PyTorch) for Machine Learning

## LANGUAGES

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Arabic (native), French (native), English (fluent), Spanish (working level).

## HOBBIES

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Classical music : violonist in the "Académie de Musique de Paris" orchestra conducted by Jean-Philippe Sarcos (50 musicians and more than 100 singers), music theory diploma and violin diploma.

## REFERENCES

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**Prof. Pascal Bianchi**

Professor in the Image, Data and Signal Department in the Signal, Statistics and Learning group at  
Télécom Paris, Institut Polytechnique de Paris

Email: [pascal.bianchi@telecom-paris.fr](mailto:pascal.bianchi@telecom-paris.fr)

**Prof. Walid Hachem**

Research director at the French National Research Centre (CNRS), Gustave Eiffel University, Gaspard  
Monge Computer Science Laboratory (LIGM)

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