Anas Barakat

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EDUCATION

2018 - 2021 **Institut Polytechnique de Paris, Télécom Paris**
Ph.D. in Applied Mathematics and Computer Science
Thesis: Contributions to non-convex stochastic optimization and reinforcement learning.
Advisors: Prof. Pascal Bianchi and Prof. Walid Hachem

2017 - 2018 **Université Paris Saclay**
M.Sc. in Data Science (with highest honors)

2015 - 2018 **Télécom Paris**
M.Sc. in Applied Mathematics and Computer Science, Engineering Degree
Machine Learning track
Top 5% ranking in one of the top french engineering schools

2013 - 2015 Classes préparatoires (intensive courses of Mathematics and Physics)
Post-secondary studies leading to the nationwide highly competitive exam
for admission to a graduate-level engineering school ("Grande Ecole")

PUBLICATIONS

Preprints

Anas Barakat, Pascal Bianchi and Julien Lehmann.
Analysis of a Target-Based Actor-Critic Algorithm with Linear Function Approximation.
Under Review, 2021.

Journal and peer-reviewed conference papers

Anas Barakat, Pascal Bianchi, Walid Hachem, and Sholom Schechtman.
Stochastic optimization with momentum: convergence, fluctuations, and traps avoidance.
Electronic Journal of Statistics 15 (2), 3892-3947, 2021.

Anas Barakat and Pascal Bianchi.
Convergence and Dynamical Behavior of the Adam Algorithm for Non-Convex Stochastic Optimization.
SIAM Journal on Optimization 31 (1), 244-274, 2021.

Anas Barakat and Pascal Bianchi.
Convergence Rates of a Momentum Algorithm with Bounded Adaptive Step Size for Nonconvex Optimization.
Proceedings of The 12th Asian Conference on Machine Learning (ACML), vol.129, 225-240, 2020.

Anas Barakat and Pascal Bianchi.
Convergence de l'algorithme Adam du point de vue des systèmes dynamiques.
The 27th Francophone Colloquium of Signal and Image Processing (GRETSI), 2019.

Thesis

Anas Barakat.
Contributions to non-convex stochastic optimization and reinforcement learning.
PhD dissertation, Institut Polytechnique de Paris, 2021

PRESENTATIONS

Talks

"Stochastic optimization with momentum: convergence, fluctuations, and traps avoidance."

20 Dec 2021 Invited talk, 14th CMStatistics International Conference
Session: "Dynamical systems in machine learning" organized by Anna Korba.
King's College, London, United Kingdom

"Convergence and dynamical behavior of the ADAM algorithm for non-convex stochastic optimization."

15 Oct 2020 Invited Seminar, "Image, Optimization and Probabilities" research group
Bordeaux Institute of Mathematics (IMB), Bordeaux, France

21 Sep 2020 2nd Symposium on Machine Learning and Dynamical Systems
Fields Institute for Research in Mathematical Sciences, online

7 Sep 2020 Mathematical Optimization and Decision (MODE) group days
French Society of Applied and Industrial Mathematics (SMAI), online

17 Oct 2019 Mathematics of Optimization and Applications (MOA) annual days
National Institute of Applied Sciences (INSA), Rennes, France

"Convergence of the ADAM algorithm from a dynamical systems viewpoint."

12 Sep 2019 Junior Conference on Data Science and Engineering
Centrale Supélec, Gif-sur-Yvette, France

29 Aug 2019 Francophone colloquium of Signal and Image Processing (GRETSI)
Lille University, Lille, France

Posters

"Convergence analysis of a momentum algorithm with adaptive step size for non-convex optimization."

14 Dec 2019 11th OPT Workshop on Optimization for Machine Learning
Exchange Hotel Vancouver, Vancouver, Canada

"Convergence of the ADAM algorithm from a dynamical systems viewpoint."

8 Oct 2019 International Workshop on Machine Learning and Artificial Intelligence
Télécom Paris, Paris, France

2 Oct 2019 Machine Learning in the Real World workshop
Criteo, Paris, France

5 Aug 2019 International Conference on Continuous Optimization (ICCOPT)
Technical University (TU) of Berlin, Berlin, Germany

24 June 2019 Data Science Summer School (DS3)
Ecole Polytechnique, Palaiseau, France

PROFESSIONAL SERVICE

Reviewer for:
Systems & Control Letters,
International Conference on Artificial Intelligence and Statistics (AISTATS): 2022,
IEEE Transactions on Image Processing journal.

Workshop Organizer:
RL workshop for industrial partners (Airbus Defence & Space, Engie, Idemia, Safran and Valeo) of the Data Science & Artificial Intelligence for Digitalized Industry & Services research and teaching chair.

RESEARCH INTERNSHIP

04/2018 - 09/2018 **Télécom Paris**
Topic: Adaptive gradient algorithms for first-order optimization
Supervisor: Prof. Pascal Bianchi
Funding: French National Research Center (CNRS)

TEACHING EXPERIENCE

2018 - 2021 **Télécom Paris**
Instructor for a probability course on discrete Markov chains

Tutor for the courses (more than 150 hours): Machine Learning (MDI343-724), Optimization for Machine Learning (SD-TSIA211), Statistics (MDI220), Statistics: Linear Models (SD204), Probabilities (MDI104).

2017 - 2018 **Ecole Polytechnique**
Tutor for undergraduate students in Computer Science (about 20 hours)
Design and Analysis of Algorithms (INF421), Advanced Programming (INF441).

MENTORING EXPERIENCE

05/2021 - 10/2021 Supervision of a Master student research internship (Julien Lehmann)

10/2018 - 02/2019 Supervision of two Master students final research and innovation project
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

AWARDS AND SCHOLARSHIPS

9 Sep 2021 Dodu Prize http://smai.emath.fr/spip.php?article624&lang=en
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. Caillau, S. Gaubert, V. Leclere, P. Mertikopoulos, F. Santambrogio (president of the jury), H. Zidani

2018-2021 Mines-Télécom Institute (IMT) Ph.D scholarship
Future & Disruptive innovation research program
Awarded to top 5% students of Télécom Paris.

2015-2018 Moroccan Government Merit Scholarship
Moroccan Ministry of Higher Education, Scientific Research and Professional Training
Awarded to students in top french engineering and business schools.

2013-2015 Agency for French Education Abroad (AEFE) "Excellence-Major" scholarship
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

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

LANGUAGES

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

HOBBIES

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

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

Walid Hachem
Research director at the French National Research Centre (CNRS), Gustave Eiffel University, Gaspard Monge Computer Science Laboratory (LIGM)
Email: walid.hachem@univ-eiffel.fr