Anas Barakat

Ph.D. Student

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Education

october 2018–	**Doctor of Philosophy Degree**, *IP Paris, Télécom Paris*, Paris, in preparation. Dynamical study of optimization algorithms in random environments. Supervised by Pascal Bianchi and Walid Hachem.
2017–2018	**Master of Science in Data Science (M2)**, *Université Paris Saclay*, Paris, *Highest honors*. International Masters program jointly operated by Ecole Polytechnique and Télécom ParisTech, in collaboration with ENSAE and Université Paris-Sud.
2015–2018	**Master of Science, Engineer Degree**, *Télécom ParisTech*, Paris, top 5% ranking. Data science, applied mathematics, advanced probabilities and statistics, stochastic calculus, computer science
2013–2015	**Preparatory classes**, *Lycée Stanislas*, Paris. Post-secondary studies leading to the nationwide highly competitive exam for admission to a graduate-level Engineering School ("Grande Ecole"), Intensive courses of Mathematics and Physics
2013	**International Baccalaureate**, *Lycée Descartes*, Rabat, Morocco, *with high honors*. Merit sholarship

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Experience

10/2018–	**Ph.D student**, *IP Paris, Télécom Paris*, Paris. Dynamical study of optimization algorithms in random environments for Machine Learning. Supervised by Pascal Bianchi and Walid Hachem.
4/2018-9/2018	**Research Internship**, *Télécom ParisTech*, Paris. Studied adaptive optimization algorithms for Machine Learning applications. Supervised by Pascal Bianchi. Funded by the CNRS - Gaspard-Monge Computer Science Laboratory (LIGM), Paris-Est Marne-La-Vallée University.
3/2017	**Athens Program**, *Technical University of Delft*, Delft, Netherlands. European Student Exchange Implemented Finite Elements Algorithms to solve differential equations in MATLAB.
11/2016	**Athens Program**, *Technical University of Munich*, Munich, Germany. European Student Exchange Implemented failure probabilities computation for systems to estimate structural reliability (Monte-Carlo estimation) in MATLAB.

Publications

A. B. and Pascal Bianchi. Convergence and dynamical behavior of the adam algorithm for non-convex stochastic optimization. *arXiv preprint arXiv:1810.02263*, 2018.

A. B. and Pascal Bianchi. Convergence analysis of a momentum algorithm with adaptive step size for non-convex optimization. *arXiv preprint arXiv:1911.07596*, 2019.

A. B. and Pascal Bianchi. Convergence de l'algorithme adam du point de vue des systèmes dynamiques. *GRETSI*, 2019.

━━━━━ Talks and Posters

December 14th 2019
11th OPT Workshop on Optimization for Machine Learning 2019, Vancouver, Canada.
Convergence Analysis of a Momentum Algorithm with Adaptive Step Size for Non-convex Optimization, accepted paper as a poster

October 17th 2019
GdR Mathematics of Optimization and Applications (MOA) annual days 2019, *INSA*, Rennes, France.
Convergence and Dynamical Behavior of the ADAM Algorithm for Non Convex Stochastic Optimization, talk

October 8th 2019
International Workshop on Machine Learning and Artificial Intelligence (MLAI), *Télécom Paris*, Paris, France.
Poster

October 2nd 2019
Machine Learning in the Real World workshop, *Criteo*, Paris, France.
Spotlight Talk and Poster

September 12th 2019
JDSE 2019, *Centrale Supéléc*, Gif-sur-Yvette, France.
Convergence of the ADAM algorithm from a Dynamical System Viewpoint, talk

August 29th 2019
GRETSI 2019, *Université de Lille*, Lille, France.
Convergence de l'Algorithme Adam du Point de Vue des Systèmes Dynamiques (in french), oral presentation of the paper

August 5th 2019
ICCOPT 2019, *TU Berlin*, Berlin, Germany.
Poster, Convergence of the ADAM Algorithm from a Dynamical Systems Viewpoint

June 24th 2019
Data Science Summer School (DS3), *Ecole Polytechnique*, Palaiseau, France.
Poster, Convergence of the ADAM Algorithm from a Dynamical Systems Viewpoint

━━━━━ Teaching and Tutoring Experience

I am a Teaching assistant at Télécom Paris. Since september 2018, I conduct exercises sessions, give few lectures, supervise lab sessions, evaluate students projects and grade final exams. I am in particular involved in the following courses (more than 128 hours) :

2018–2020
Optimization for Machine Learning, *Télécom Paris*, SD-TSIA211.
32 master students, *2 x 12 hours*
Topics: convex analysis, gradient descent, proximal point method, proximal gradient method, stochastic gradient descent, duality, ADMM.

2018–2020
Statistics, *Télécom Paris*, MDI220.
32 master students, *2 x 8 hours*
Topics: point estimation, quadratic risk, bias-variance tradeoff, Fisher information, Cramér-Rao bound, bayesian model, statistical tests, confidence intervals.

2019–2020
Statistics : Linear Models, *Télécom Paris*, MDI220.
32 master students, *2 x 8 hours*
Topics: ordinary least-squares, confidence intervals and hypothesis testing, ridge regularization, Lasso.

2018–2020
Probabilities, *Télécom Paris*, MDI104.
30 undergraduate students, *21 hours*
Topics: discrete probabilities, discrete Markov chains, measure theory, integration, random variables, independence, characteristic function, gaussian vectors, conditional expectation, convergence of random variables.

2018–2019 **Machine Learning**, *Télécom Paris*, MDI343-724, *15 hours*.
120 Big Data Specialized Master students.
Topics: Rosenblatt's Perceptron, SGD, SVM classification and regression, ensemble learning, neural networks, unsupervised learning, time series.

2017–2018 **Tutoring**, *Ecole Polytechnique*, Paris.
Tutored 2nd year students (individually and group of 10) in computer science (INF421: Design and Analysis of Algorithms, INF441: Advanced Programming)

2018–2019 **Project of Research and Innovation for Masters**, *Télécom Paris*.
Supervised two 2nd year master students (Yuqing Wang and Zhengkang Shi) for their 6-months project in collaboration with the startup XLearn and evaluated their report and oral defense. Subject: Development of an online job advising system : learning skill titles' relations based on users' profiles using Machine Learning methods.

Projects

2017-2018 **Data challenges**, *Télécom ParisTech*, Paris.
- ○ **Prediction of the watching duration of advertising videos** : Designed a learning model using XGBoost algorithm for prediction from data provided by Teads online advertising company.
- ○ **Acoustic Scene Classification** : Ranked in the top 10 (/80) of a Kaggle-like data challenge consisting of multi-class classification, "environment" recognition from a set of 1170 audio files (30 seconds each one) corresponding to 15 classes, using neural networks in Python (scikit-learn, keras).
- ○ **Gender classification** : Participated to a Kaggle-like data challenge consisting of predicting a person's gender using features extracted from his/her photo. Data were provided by Morpho company.

2015–2016 **Smart Green House**, *Télécom ParisTech*, Paris.
Participated to a one-year project with a team of seven students to design an autonomous greenhouse to take care of plants. Tested the structure and implemented the client-server communication.

6/2016 **Quality Tester of Random Generated Numbers**, *Télécom ParisTech*, Paris.
Implemented in Python a program with a graphical interface to estimate the quality of random generated numbers using algorithms based on statistics.

Scholarships

2018– **Ph.D funding**, *Mines-Télécom Institute (IMT)*.
Future & Disruptive technologies research program, awarded to top 5% students.

2015–2018 **Merit Scholarship**, *Moroccan Ministry of Higher Education, Scientific Research and Professional Training*.
for students who reached top french engineering and business schools ('Grandes Ecoles').

2013–2015 **'Excellence-Major' scholarship**, *Agency for French Education Abroad (AEFE)*.
for foreign (non french) students who passed a baccalaureate degree in French high school with highest honors and planned to pursue high-level studies in France.

Computer skills and certifications

Designed programs and implemented algorithms for data mining, statistical purposes, and machine learning concerns using Python (scikit-learn, numpy, scipy, pandas, keras, PyTorch), R, MATLAB, developed programs in Java, C++.

8/2017 **Machine Learning by Stanford University**, *online course*, coursera.

Work Experience

summer 2016 **Worker Internship**, *Algodonera Paso Viejo*, Cordoba, Argentina.
Assisted the textile production, delivered orders and received customers in a Spanish speaking environment.

Languages

Arabic	Native	
French	Native	
English	Fluent (C2)	*Working language*
Spanish	Working level (C1)	*Experience in Argentina*

Hobbies

○ **Classical music** : violonist in the "Académie de Musique de Paris" orchestra conducted by Jean-Philippe Sarcos (50 musicians and more than 100 singers) since 2015, Music theory diploma and violin diploma (9 years).

○ **Sports**: horseback riding (first certificate in galloping and jumping in 2010), Brown belt in Full Contact (combat sport) in 2008, Swimming in a professional club.