Anas Barakat

Ph.D. Student

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Education

october 2018– **Doctor of Philosophy Degree in preparation**, *IP Paris, Télécom Paris*, Paris.
Dynamical study of optimization algorithms in random environments.
Supervised by Prof. Pascal Bianchi and Dr. 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

Experience

4/2018-9/2018 **Research Internship**, *Télécom ParisTech*, Paris.
Studied adaptive optimization algorithms for Machine Learning applications.
Supervised by Prof. 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 analysis of a momentum algorithm with adaptive step size for non-convex optimization. *ACML 2020, to appear in PMLR vol.128*.

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

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

Talks and Posters

September 21st 2020 **2nd Symposium on Machine Learning and Dynamical Systems**, Fields Institute, online.

September 7th 2020 **SMAI MODE days**, Paris Saclay, online.

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 Supélec*, 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

Academic Service

Reviewer for IEEE Transactions on Image Processing journal.

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.

Scholarships and Awards

2020 **Dodu Prize**, *SMAI MODE days*, Best young researcher's talk.
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– **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.

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.

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.