Zak Mhammedi

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EDUCATION

PhD in Computer Science *The Australian National University* Mar 2017 – present
Main Topics: Theory of online learning and statistical generalization
Supervisors: Robert C. Williamson & Wouter M. Koolen

MPhil in Computer Science *The University of Melbourne* Jul 2016 – Feb 2017
Thesis Title: Efficient Orthogonal Parametrisation of Recurrent Neural Networks Using Householder Reflections
Supervisor: James Bailey

MEng in Mechanical Engineering *The University of Melbourne* Jul 2013 – Dec 2015
Awards: Dean's Honours, iMechE Frederic Barnes Waldron Prize (top graduating student)
Supervisor: Nicolas Hutchins

BSc in Aerospace Engineering *Ecole Centrale Paris* Oct 2010 – Sep 2012

EXPERIENCE

Research Intern *Microsoft Research, New York* Mar 2020 – Jun 2020
- Worked and published research on a problem of continuous control with rich observations.

Research Intern *Centrum Wiskunde & Informatica (CWI), Amsterdam* Jan 2019 – Feb 2019
- Published research on certain adaptive online learning algorithms such as MetaGrad.
- Worked on developing a new and improved PAC-Bayesian generalization bound.

Research Visit *Centrum Wiskunde & Informatica (CWI), Amsterdam* May 2018 – Aug 2018
- Worked on adding Lipschitz adaptivity to certain 2^{nd} order adaptive online learning algorithms.

Research Assistant *CSIRO, Sandy Bay, Australia* Jul 2016 – Dec 2016
- Published research on an efficient parametrization of orthogonal recurrent neural networks.

Summer Vacation Scholar *CSIRO, Clayton, Australia* Nov 2015 – Feb 2016
- Worked on developing a dynamical control system for the simulation of certain human movements such as running.
- Implemented the control system in C++ and performed simulations.

Internship *IBM Research, Melbourne, Australia* Jul 2015 – Oct 2015
- Worked on developing a model for the theoretical spread of citrus greening in Australia.
- Implemented the model in C++ and performed simulations.

Internship *Airbus SAS, Toulouse, France* Sep 2012 – Jun 2013
- Performed numerical simulations of aircraft flights to study the flutter effect around the wings.
- Compared simulation results to data collected from wind tunnel tests on scaled aircraft models.

AWARDS

Australian Academy of Science Heidelberg Laureate Forum Fellowship *2020*
NeurIPS Travel Awards *Annual Conference on Neural Information Processing Systems* *2018* - 2019
L. R. East Prize *Engineers Australia* 2015
iMechE Frederic Barnes Waldron Prize (top graduating student) *Inst. of Mechanical Engineers* 2015
W. S. Robinson Prize (best performance in capstone project) *The University of Melbourne* 2015
Noel Mather Prize (top final year student) *The University of Melbourne* 2015
IBM Research Scholarship *IBM, Australia* 2015
CSIRO Vacation Scholarship *CSIRO* 2015
Dean's Honours (top 5% of students) *The University of Melbourne* 2014 - 2015
A. J. Francis Scholarship *The University of Melbourne* 2014

RESEARCH INTERESTS

- Online learning (e.g. parameter-free online learning, stochastic optimization).
- Generalization bounds in statistical learning (e.g. PAC-Bayesian bounds).
- Distributionally Robust Optimization
- Fairness in machine learning.

MANUSCRIPTS

- **Risk-Monotonicity in Statistical Learning**

Zakaria Mhammedi, Hisham Husain. *arXiv 2011.14126* Nov 2020

CONFERENCE PAPERS[1]

- **PAC-Bayesian Bound for the Conditional Value at Risk.**

Zakaria Mhammedi, Benjamin Guedj, and Robert C. Williamson. **NeurIPS'20**. **Spotlight presentation**[2]

- **Learning the Linear Quadratic Regulator from Nonlinear Observations.**

Zakaria Mhammedi, Dylan J Foster, Max Simchowitz, Dipendra Misra, Akshay Krishnamurthy, Alexander Rakhlin, John Langford. **NeurIPS'20**.

- **Lipschitz and Comparator Norm Adaptivity in Online Learning.**

Zakaria Mhammedi, Wouter M. Koolen. **COLT'20**.

- **PAC-Bayes Un-Expected Bernstein Inequality.**

Zakaria Mhammedi, Peter D. Grunwald, and Benjamin Guedj. **NeurIPS'19**.

- **Lipschitz Adaptivity with Multiple Learning Rates in Online Learning.**

Zakaria Mhammedi, Wouter M. Koolen, and Tim Van Erven. **COLT'19**.

- **Constant Regret, Generalized Mixability, and Mirror Descent.**

Zakaria Mhammedi and Robert C. Williamson. **NeurIPS'18**. **Spotlight presentation**

- **Geometry Aware Constrained Optimization Techniques for Deep Learning.**

Soumava Kumar Roy, Zakaria Mhammedi and Mehrtash Harandi**. CVPR'18.**

- **Efficient Orthogonal Parametrisation of Recurrent Neural Networks Using Householder Reflections.**

Zakaria Mhammedi, Andrew Hellicar, Ashfaqur Rahman, and James Bailey. **ICML'17**.

- **Adversarial Generation of Real-Time Feedback with Neural Networks for Simulation-Based Training.**

Xingjun Ma, Sudanthi Wijewickrema, Shuo Zhou, Yun Zhou, Zakaria Mhammedi, Stephen O'Leary, and James Bailey. **IJCAI'17.**

TEACHING EXPERIENCE

Tutor *The Australian National University* Aug 2017 – Oct 2018
COMP2610/COMP6261: Information Theory

Maths Tutor *Simply Maths* Oct 2013 – Oct 2014
Tutored secondary-level mathematics students

SERVICES

Program Committee COLT'21
Reviewer COLT'19, NeurIPS'19, COLT'20, ICML'20, JMLR'20, NeurIPS'20

PROGRAMMING LANGUAGES

Proficient: python + scientific toolkit (numpy, scipy), MATLAB
Familiar: R, C, C++, MATHEMATICA

[1] In all papers, authors are ordered according to their contribution.
[2] Only about 3% of submissions receive a spotlight presentation at NeurIPS.