# Ioannis Mitliagkas, assistant professor  Curriculum Vitae, October 2021

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| **Contact Information** | Department of Computer Science and Operations Research<br>University of Montréal |

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| | Mila, Quebec AI Institute |
| | 6666 St. Urbain, Montréal |

*E-mail:* ioannis@iro.umontreal.ca
*Web:* mitliagkas.github.io

**Research Interests**

Statistical machine learning, optimization, high-dimensional statistics, MCMC methods, large-scale and distributed learning systems.

**Academic appointments**

**University of Montréal**  September 2017 -

Assistant Professor, Department of Computer Science and Operations Research
Core member, Mila
Canada CIFAR AI chair

**Stanford University**  2015-2017

Postdoctoral Research Fellow, Departments of Statistics and Computer Science
Supervised by: Associate Prof. Christopher Ré, Adjunct Prof. Lester Mackey

**Industry Affiliations**

**ElementAI, Montréal**  2018-2020

Faculty Fellow

**Education**

**The University of Texas at Austin**

PhD, ECE department.  Awarded in August 2015
**Advised by:** Prof. Constantine Caramanis and Prof. Sriram Vishwanath
**Thesis topic:** Resource-Constrained, Scalable Learning

**Technical University of Crete**, Chania, Greece

MSc., ECE department.  2008 - 2010

Diploma, Electronic and Computer Engineering (5 year degree),  2002 - 2008
**Advisor:** Professor Nikos D. Sidiropoulos

RESEARCH GRANTS   During my first four years of tenure-track work, I was awarded a total of about 67 PhD-years in competitive funding (about 1.8 million CAD after subtracting any overhead), to be disbursed over a period of 6 years.

- Microsoft Research collaborative grant, awarded January 2021

- Samsung-Mila collaborative three-year grant, awarded September 2020.

- IVADO Postdoctoral Scholarship, for my postdoc K. Ahuja, awarded August 2020

- CIFAR Catalyst Grant, in collaboration with Manuela Girotti and Murat Erdogdu (UofT, Vector).

- IVADO Postdoctoral Scholarship, Fellow tier, for my postdoc N. Loizou, awarded December 2019

- Microsoft Research collaborative grant, awarded June 2019

- NSERC Discovery, awarded April 2019 (+ competitive accelerator supplement)

- CIFAR Canada AI chair, awarded December 2018

- Fonds de Recherche du Québec, Nature et technologies, Nouveau Chercheur, 2018

- IVADO professorship grant, 2017

POSTDOCS

Nicolas Loizou (postdoc → assistant prof. at Johns Hopkins starting 2022 )

Kartik Ahuja (postdoctoral scholar)

Kilian Fatras (postdoctoral scholar; starting January 2022)

DOCTORAL STUDENTS

Brady Neal (PhD candidate)

Reyhane Askari (PhD candidate)

Adam Ibrahim (PhD candidate)

Alexia Jolicoeur-Martineau (PhD candidate)

Charles Guille-Escuret (PhD candidate)

Ryan D'Orazio (PhD student)

Hiroki Naganuma (PhD student)

MASTERS STUDENTS

Mehrnaz Mofakhami (MSc student)

Divyat Mahajan (MSc student)

Manuela Girotti (postdoctoral scholar → assistant prof. at Saint Mary's University)

Rémi Piché-Taillefer (graduated MSc summer 2021 → Microsoft Research, Montréal)

Brady Neal (graduated MSc, December 2019; continuing his PhD at Mila)

Séb Arnold (intern, summer 2018; PhD candidate at USC)

Vinayak Tantia (intern, 2018, now at FAIR Montréal)

Baptiste Goujeaud (intern, 2020; PhD candidate Ecole Polytechnique )

Amartya Mitra (intern, summer 2020; PhD candidate at UC Riverside)

Nicolas Gagné (intern, summer 2018; PhD candidate at McGill)

Jian Zhang (mentee; PhD candidate at Stanford)

Panos Achlioptas (mentee; PhD candidate at Stanford)

## TEACHING

| **University of Montreal** | Latest teaching evaluation: 3.7/4.0 |
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| *Fundamentals of machine learning* | **Fall 2021** |
| *Theoretical principles for deep learning* | **Winter 2021** |
| *Fundamentals of machine learning* | **Fall 2020** |
| *Theoretical principles for deep learning* | **Winter 2020** |
| *Fundamentals of machine learning* | **Fall 2019** |
| *Theoretical principles for deep learning* | **Winter 2019** |
| *Fundamentals of machine learning* | **Fall 2018** |
| *Theoretical principles for deep learning* | **Winter 2018** |

| **The University of Texas at Austin** | |
| --- | --- |
| *Teaching Assistant—Information Theory* | **Spring 2012** |

| **Technical University of Crete** | |
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| *Teaching Assistant—Telecommunication Networks* | **Fall 2008** |

## PUBLICATIONS

K. Ahuja, E. Caballero, D. Zhang, Y. Bengio, **I. Mitliagkas**, I. Rish.
Invariance Principle Meets Information Bottleneck for Out-of-Distribution Generalization
*Neural Information Processing Systems (NeuRIPS), 2021.*   [**spotlight presentation**]

N. Loizou, H. Berard, G. Gidel, **I. Mitliagkas**, S. Lacoste-Julien.
Stochastic Gradient Descent-Ascent and Consensus Optimization for Smooth Games:
Convergence Analysis under Expected Co-coercivity
*Neural Information Processing Systems (NeuRIPS), 2021 .*

A. Jolicoeur-Martineau, R. Piche-Taillefer, **I. Mitliagkas**, R. Tachet des Combes.
Adversarial score matching and improved sampling for image generation
*International Conference on Learning Representations (ICLR), 2021.*

C. Guille-Escuret*, B. Goujaud*, M. Girotti, **I. Mitliagkas**.
A Study of Condition Numbers for First-Order Optimization
*Artificial Intelligence and Statistics (AISTATS) 2021*. [**best student paper award OPT2020**]

G. K. Dziugaite, A. Drouin, B. Neal, N. Rajkumar, E. Caballero, L. Wang, **I. Mitliagkas**, D. Roy.
In search of robust measures of generalization
*Neural Information Processing Systems (NeurIPS), 2020*.

N. Loizou, H. Berard, A. Jolicoeur-Martineau, P. Vincent, S. Lacoste-Julien, **I. Mitliagkas**.
Stochastic Hamiltonian Gradient Methods for Smooth Games
*International Conference on Machine Learning (ICML), 2020*.

A. Ibrahim, W. Azizian, G. Gidel, **I. Mitliagkas**.
Linear Lower Bounds and Conditioning of Differentiable Games
*International Conference on Machine Learning (ICML), 2020*.

W. Azizian, D. Scieur, **I. Mitliagkas**, S. Lacoste-Julien, G. Gidel.
Accelerating Smooth Games by Manipulating Spectral Shapes
*Artificial intelligence and Statistics (AISTATS), 2020*

W. Azizian, **I. Mitliagkas**, S. Lacoste-Julien, G. Gidel.
A Tight and Unified Analysis of Gradient-Based Methods for a Whole Spectrum of Differentiable Games
*Artificial Intelligence and Statistics (AISTATS), 2020*

S. M. Arnold, P. A. Manzagol, R. Babanezhad, **I. Mitliagkas**, N. L. Roux.
Reducing the variance in online optimization by transporting past gradients.
*Neural Information Processing Systems (NeurIPS), 2019* [**spotlight presentation**].

I. Albuquerque, J. Monteiro, T. Doan, B. Considine, T. Falk, **I. Mitliagkas**.
Multi-objective training of Generative Adversarial Networks.
*International Conference on Machine Learning (ICML), 2019*.

V. Verma, A. Lamb, C. Beckham, A. Najafi, **I. Mitliagkas**, A. Courville, D. Lopez-Paz, Y. Bengio.
Manifold Mixup: Better Representations by Interpolating Hidden States .
*International Conference on Machine Learning (ICML), 2019*.

A. Lamb, J. Binas, A. Goyal, S. Subramanian, **I. Mitliagkas**, Y. Bengio, M. Mozer.
State-Reification Networks: Improving Generalization by Modeling the Distribution of Hidden Representations.
*International Conference on Machine Learning (ICML), 2019* [**oral presentation**].

B. Kanuparthi, D. Arpit, G. Kerg, N. R. Ke, **I. Mitliagkas**, Y. Bengio.
h-detach: Modifying the LSTM Gradient Towards Better Optimization .
*International Conference on Learning Representations (ICLR), 2019*.

G. Gidel, R. Askari, M. Pezeshki, G. Huang, S. Lacoste-Julien, **I. Mitliagkas**.
Negative Momentum for Improved Game Dynamics.
*Artificial Intelligence and Statistics (AISTATS), 2019*.

J. Zhang, **I. Mitliagkas**.
YellowFin and the Art of Momentum Tuning.
*Systems and ML (SysML), 2019*.

P. Achlioptas, O. Diamanti, **I. Mitliagkas**, L. Guibas.
Learning Representations and Generative Models for 3D Point Clouds.
*International Conference on Machine Learning (ICML), 2018.*

J. Zhang, **I. Mitliagkas**.
YellowFin: Adaptive optimization for (A)synchronous systems.
*Systems and ML (SysML), 2018* [**oral presentation**].

C. De Sa, B. He, **I. Mitliagkas**, C. Ré, P. Xu.
Accelerated stochastic power iteration.
*Artificial Intelligence and Statistics (AISTATS), 2018.*

T. Kurth, J. Zhang, N. Satish, **I. Mitliagkas**, E. Racah, M.A. Patwary, T. Malas, N. Sundaram, W. Bhimji, M. Smorkalov, J. Deslippe, M. Shiryaev, S. Sridharan, P. Dubey.
Deep Learning at 15PF: Supervised and Semi-Supervised Classification for Scientific Data.
*Supercomputing (SC), 2017.*

**I. Mitliagkas**, L. Mackey.
Improving Gibbs Sampler Scan Quality with DoGS.
*International Conference on Machine Learning (ICML), 2017.*

**I. Mitliagkas**, C. Zhang, S. Hadjis, C. Ré.
Asynchrony begets Momentum, with an Application to Deep Learning.
*Allerton Conference on Communication, Control, and Computing, 2016.*

B. He, C. De Sa, **I. Mitliagkas**, C. Ré.
Scan Order in Gibbs Sampling: Models in Which it Matters and Bounds on How Much.
*Neural Information Processing Systems (NIPS), 2016.*

**I. Mitliagkas**, M. Borokhovich, A. Dimakis, C. Caramanis.
FrogWild! – Fast PageRank Approximations on Graph Engines.
*VLDB, 2015.*

D. Papailiopoulos, **I. Mitliagkas**, A. Dimakis, C. Caramanis.
Finding dense subgraphs through low-rank approximations.
*International Conference on Machine Learning (ICML), 2014.*

**I. Mitliagkas**, C. Caramanis, P. Jain.
Memory-limited Streaming PCA.
*Neural Information Processing Systems (NIPS), 2013.*

**I. Mitliagkas**, A. Gopalan, C. Caramanis, S. Vishwanath.
User Rankings from Comparisons: Learning Permutations in High Dimensions.
*Allerton Conference on Communication, Control, and Computing, 2011.*

**I. Mitliagkas**, N. D. Sidiropoulos, and A. Swami.
Joint Power and Admission Control for Ad-hoc and Cognitive Underlay Networks: Convex Approximation and Distributed Implementation.
*IEEE Transactions on Wireless Communications, 2011.*

**I. Mitliagkas**, S. Vishwanath.
Strong Information-Theoretic Limits for Source/Model Recovery.
*Allerton Conference on Communication, Control, and Computing, 2010.*

**I. Mitliagkas**, N. D. Sidiropoulos, and A. Swami.
Distributed Joint Power and Admission Control for Ad-hoc and Cognitive Underlay Networks.
*ICASSP 2010.*

**I. Mitliagkas**, N. D. Sidiropoulos, and A. Swami.
Convex Approximation-based Joint Power and Admission Control for Cognitive Underlay Networks.
*International Wireless Comm. and Mobile Computing Conference, 2008. IWCMC'08. IEEE.*

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<tr>
<td>PREPRINTS,<br>WORKSHOP PAPERS</td>
<td>

R. Askari Hemmat*, A. Mitra*, G. Lajoie, **I. Mitliagkas**.
LEAD: Least-Action Dynamics for Min-Max Optimization
*under review, 2021.*

I. Albuquerque, J. Monteiro, T. Falk, **I. Mitliagkas**.
Generalizing to unseen domains via distribution matching
*preprint, 2020.*

A. Jolicoeur-Martineau, **I. Mitliagkas**.
Gradient penalty from a maximum margin perspective
*preprint, 2020*

B. Neal, **I. Mitliagkas**.
In Support of Over-Parametrization in Deep Reinforcement Learning: an Empirical Study
*ICML 2019 Workshop on Identifying and Understanding Deep Learning Phenomena*

B. Neal, S. Mittal, A. Baratin, V. Tantia, M. Scicluna, S. Lacoste-Julien, **I. Mitliagkas**.
A Modern Take on the Bias-Variance Tradeoff in Neural Networks
*ICML 2019 Workshop on Identifying and Understanding Deep Learning Phenomena*

J. Zhang, C. De Sa, **I. Mitliagkas**, C. Ré.
Parallel SGD: When does averaging help?
*Optimization Methods for the Next Generation of Machine Learning Workshop, ICML 2016.*

S. Hadjis, C. Zhang, **I. Mitliagkas**, C. Ré.
Omnivore: An Optimizer for Multi-device Deep Learning on CPUs and GPUs. Technical report, arXiv:1606.04487.

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<td>IN THE PRESS</td>
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Trudeau meets with newly appointed Canada CIFAR AI Chairs, **CIFAR News**

Sept chercheurs de lUdeM titulaires de chaires en intelligence artificielle Canada-CIFAR, **UdeM Nouvelles**

NERSC Scales Scientific Deep Learning to 15 Petaflops, **HPC Wire**

De la Grèce à l'UdeM: l'étonnant parcours d'Ioannis Mitliagkas, **UdeM Nouvelles**

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| Awards,<br>Distinctions | NeurIPS Foundation, top 10% of reviewers, 2020 |
| | CIFAR Canada AI chair |
| | NIPS Foundation, listed among best reviewers, 2018 |
| | Gerondelis Foundation Inc.: Graduate Scholarship, 2014 |
| | The University of Texas at Austin: Microelectronics and Computer Development (MCD) Fellowship, 2009-2011 |
| | Technical University of Crete: Undergraduate excellence award, 2008 |
| | State Scholarships Foundation (Greece): Undergraduate excellence award, 2005 |
| | Technical Chamber of Greece: Undergraduate excellence award, 2005 |

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| Professional<br>Service | Co-organizer of INFORMS 2021 workshop:<br>"Accelerated methods in convex and non-convex optimzation" |
| | Co-founder and organizer of MTL MLOpt, a Montreal-based group of researchers from many universities and industrial labs. |
| | Member of the inaugural program committee of MLSys:<br>The committee's role was to decide the conference's focus and steer its future goals. |
| | Organizer of NeurIPS 2018, 2019 workshop:<br>"Smooth Games Optimization and Machine Learning" |
| | Reviewer of MITACS Accelerate grants |
| | Served as head of the scientific committee in charge of evaluating IVADO grants (2018) and as member in subsequent years. |
| | Reviewer and AC for a number of journals and conferences including NeurIPS, ICML, COLT, AISTATS, AAAI, ICLR, JMLR (editorial board), IJCAI, SIGGRAPH, Transactions on Information Theory, ISIT, ICASSP, Transactions on Wireless Communications. |

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| Recent Invited<br>Talks (not<br>including<br>accepted paper<br>presentations) | Simons semester in game theory, Berkeley, CA | January-March, 2022 |
| | SIAM conference in optimization OP21, Spokane, WA | July 2021 |
| | Neuromatch Academy Deep Learning Track, World-wide | Summer 2021 |
| | AI4Good Summer School, Canada | May 2021 |
| | Google Brain, Montreal, QC | November 2020 |
| | ITA, San Diego, CA | February 2020 |
| | INFORMS, Seattle, WA | October 2019 |
| | Microsoft Research workshop, Montréal, QC | October 2019 |
| | Theoretical Advances in Deep Learning, Workshop, Istanbul | July 2019 |
| | UT Austin, TX | March 2019 |
| | NVIDIA, Webinar | March 2019 |

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| ElementAI, Toronto, ON | November 2018 |
| BorealisAI, Toronto, ON | October 2018 |
| USC, Los Angeles, CA | October 2018 |
| Microsoft Research workshop, Montréal, QC | October 2018 |
| ElementAI, Toronto, ON | September 2018 |
| Microsoft Research, Montréal, QC | August 2018 |
| ElementAI, Montréal, QC | June 2018 |
| FAIR, Montréal, QC | May 2018 |
| RLLab, McGill, Montréal, QC | April 2018 |
| ElementAI, Montréal, QC | April 2018 |
| TechAide, Montréal, QC | April 2018 |
| ECE Seminar, UT Austin, TX | March 2018 |
| BayesComp, Barcelona Spain | March 2018 |
| SysML, Stanford CA | February 2018 |
| Google Brain, Montréal | November 2017 |
| Texas Wireless Summit, Austin, TX | October 2017 |
| Colloquium, University of Montréal | September 2017 |
| Colloquium, The University of Texas, Austin | September 2017 |
| AutoML workshop, ICML, Sydney | August 2017 |
| Workshop on Advances in Computing Architectures, Stanford SystemX | April 2016 |
| ITA workshop, San Diego, CA | February 2017 |
| AAAI 2017 Workshop on Distributed Machine Learning | February 2017 |
| Microsoft Research, Cambridge, UK | December 2016 |
| SystemX Stanford Alliance Fall Conference | November 2016 |
| Microsoft Research, New England | October 2016 |
| Allerton Conference, Monticello, IL | September 2016 |
| Google Brain, Mountain View, CA | August 2016 |
| MIT Lincoln Labs, MA | August 2016 |
| NVIDIA, Santa Clara, CA | July 2016 |