

Workshop II: PDE and Inverse Problem Methods in Machine Learning

Monday April 20, 2020

- 8:20–8:30 *Welcome & Opening Remarks: Dean Miguel García-Garibay (Dean of Physical Sciences, UCLA) and Dima Shlyakhtenko (Director, IPAM)*
- 8:30 *Session Chair Adam Oberman (McGill University)*
- 8:30–9:20 **Jianfeng Lu** (Duke University)
PDE analysis for sampling dynamics and generative models
- 9:30–9:45 *Break*
- 9:45–10:35 **Matti Lassas** (University of Helsinki)
New deep neural networks solving non-linear inverse problems
- 10:45–11:00 *Break*
- 11:00–11:50 *Lightning Poster Presentations: Yiping Lu (Stanford); Tingwei Meng (Brown); Elisa Negrini (WPI); Mirjeta Pasha (Kent State); Lorenz Richter (FU Berlin)*
- 12:00–1:00 *Lunch (on your own)*
- 1:00–1:50 **Michael Jordan** (University of California, Berkeley (UC Berkeley))
Optimization with Momentum: Dynamical, Control-Theoretic, and Symplectic Perspectives
- 2:00–2:15 *Break*
- 2:15–3:05 **Maxime Laborde** (McGill University)
A Lyapunov analysis for accelerated gradient methods: From deterministic to stochastic case

Tuesday April 21, 2020

- 8:30 *Session Chair Ivan Yegorov (NDSU)*
- 8:30–9:20 **Peng Chen** (University of Texas at Austin)
Projected Stein variational methods for high-dimensional Bayesian inversion constrained by large-scale PDEs
- 9:30–9:45 *Break*
- 9:45–10:35 **Eldad Haber** (University of British Columbia)
A-optimal active learning
- 10:45–11:00 *Break*

(Tuesday schedule continued on next page)



(Tuesday schedule continued from previous page)

- 11:00–11:50 **Max Raginsky** (University of Illinois at Urbana-Champaign)
A mean-field theory of lazy training in two-layer neural nets: entropic regularization and controlled McKean-Vlasov dynamics
- 12:00–1:00 *Lunch (on your own)*
- 1:00–1:50 **Stefano Soatto** (University of California, Los Angeles (UCLA))
Critical Periods for Regularization in Deep Neural Networks
- 2:00–2:15 *Break*
- 2:15–3:05 **Mikhail Belkin** (Ohio State University)
Toward a theory of optimization for over-parameterized systems of non-linear equations: the lessons of deep learning

Wednesday April 22, 2020

- 8:30 *Session Chair Pratik Chaudhari (University of Pennsylvania)*
- 8:30–9:20 **Irène Waldspurger** (Université de Paris IX (Paris-Dauphine))
Rank optimality of the Burer-Monteiro factorization
- 9:30–9:45 *Break*
- 9:45–10:35 **Yunan Yang** (New York University)
The joint power of deterministic and Bayesian approaches for seismic inverse problems
- 10:45–11:00 *Break*
- 11:00–11:50 **Anthony Yezzi** (Georgia Institute of Technology)
Accelerated Optimization in the PDE Framework
- 12:00–1:00 *Lunch (on your own)*
- 1:00–1:50 **Hossein Mobahi** (Google AI)
Differential Operators for Generating Structured Adversarial Examples
- 2:00–2:15 *Break*
- 2:15–3:05 **Tom Goldstein** (University of Maryland)
An empirical look at generalization in neural nets

Thursday April 23, 2020

- 8:30 *Session Chair Dejan Slepcev (Carnegie Mellon University)*
- 8:30–9:20 **Wuchen Li** (University of California, Los Angeles (UCLA))
Accelerated Information Gradient flow
- 9:30–9:45 *Break*
- 9:45–10:35 **Christopher Finlay** (McGill University)
Training neural ODEs for density estimation
- 10:45–11:00 *Break*
- 11:00–11:50 **Rebecca Willett** (University of Chicago)
Learning to Solve Inverse Problems in Imaging
- 12:00–1:00 *Lunch (on your own)*
- 1:00–1:50 **Quanquan Gu** (University of California, Los Angeles (UCLA))
Learning Over-parameterized Neural Networks: From Neural Tangent Kernel to Mean-field Analysis
- 2:00–2:15 *Break*
- 2:15–3:05 **Pratik Chaudhari** (University of Pennsylvania)
Learning with few labeled data

Friday April 24, 2020

- 8:30 *Session Chair Marc Sedjro (AIMS South Africa)*
- 8:30–9:20 **Nicolas Garcia Trillos** (University of Wisconsin-Madison)
From clustering with graph cuts to isoperimetric inequalities: quantitative convergence rates of Cheeger cuts on data clouds
- 9:30–9:45 *Break*
- 9:45–10:35 **Jeff Calder** (University of Minnesota, Twin Cities)
Graph-based semi-supervised learning with very few labels
- 10:45–11:00 *Break*
- 11:00–11:50 **Pengchuan Zhang** (Microsoft Research)
Training invertible multi-scale deep generative networks for solving high-dimensional Bayesian Inverse Problems
- 12:00 *Conclusion*

