Yiping Lu

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EDUCATION

Peking University, Beijing, China
Major in Information and Computing Science,
Department of Scientific & Engineering Computing,
School of Mathematic Science, 2015– GPA: 3.84/4(Top1/39)

Visiting Student, MIT
Geometric Data Processing Group
Department of Electrical Engineering & Computer Science, Computer Science and Artificial Intelligence Laboratory (CSAIL)
2018.7-2018.9

RESEARCH INTEREST

Geometry and PDE methods for image processing and data analysis.
PDEs on manifold for geometry processing and semi-supervised learning.
Deep learning theory and kernel learning theory.

PUBLICATIONS

Zichao Long*, **Yiping Lu***, Xianzhong Ma*, Bin Dong. *PDE-Net:Learning PDEs From Data*, *Thirty-fifth International Conference on Machine Learning (ICML)*, 2018.(*equal contribution.)

Yiping Lu, Aoxiao Zhong, Quanzheng Li, Bin Dong.*Beyond Finite Layer Neural Network: Bridging Deep Architects and Numerical Differential Equations*, *Thirty-fifth International Conference on Machine Learning (ICML)*, 2018.

Xiaoshuai Zhang*, **Yiping Lu***, Jiaying Liu, Bin Dong. *Dynamically Unfolding Recurrent Restorer: A Moving Endpoint Control Method for Image Restoration*, *preprint*, 2018.(*equal contribution.) arXiv:1805.07709 *Submit To ICLR2019*

Zichao Long, Yiping Lu, Bin Dong. PDE-Net 2.0: Learning PDEs from Data with A Numeric-Symbolic Hybrid Deep Network, 2018. *Submitted To Journal Of Computational Physics*

Bin Dong, Ting Lin, Yiping Lu, Zuowei Shen. A New Edge Driven Wavelet Frame Image Restoration Model: The Mumford–Shah functional, Unnatural Zero Norm Minimization And Beyond, 2018. *In preparation*(Alphabetical Order.)

INTERNSHIP

Tusimple, Beijing, China, Algorithm Intern
Optical Flow For Self-driving Cars,
2017.12-2018.2

Microsoft Research Asia, Beijing, China,Vision Computing Group
Mentor: David Wipf
Bayesian Sparsity, Deep Learning and Generative Models,
2018.11-

INVITED TALKS

Seminar for the elite phd students training program in applied and computational math. 2017.10
Forum on Artificial Intelligence Frontiers (Beijing, China) 2018.3
Machine Learning Theory Workshop (Peking University) 2018.6
The Level Set Collective, UCLA 2018.8
Tutorial: Dynamic System and Optimal Control Perspective of Deep Learning and Beyond, ACML (With Prof. Bin Dong) 2018.11

PROJECTS

Dynamic System And Deep Learning:
Advisor: Bin Dong 2017.5–Now
Collaborator: Zichao Long, Xianzhong Ma, Aoxiao Zhong, Xiaoshuai Zhang.

- Combined deep learning and traditional numerical scheme to have the most flexibility by learning both differential operators and the nonlinear response function of the underlying PDE model, while preserving the transparency.
- Considered the neural network as a continuous dynamic system via turning the layer index into time.

Bridging Wavelet Sparsity Models, Mumford-Shah Model And It's Variation On Manifold:
Advisor: Bin Dong 2017.12–Now
Collaborator: Ting Lin

- Proposed a Gamma convergence result for a modified ell_0 wavelet analysis model to the Mumford-Shah model, which reveals a geometry view of the sparsity a measure of the non-Lebesgue points.

Differential Equation View Of Optimization Methods:
Advisor: Ming Jiang, Bin Dong 2017.9-2018.1
Course Project **Report:** http://about.2prime.cn/DOPT.pdf

- Analyzing the continuum limit of an optimization method when taking the step size to zero.
- Understanding the acceleration method in an optimal control framework.

Optimal Transport For Sparse Approximation:
Advisor: Justin Solomon 2018.7–2018.9

- Proposed a convex model and designed a fast optimization method to construct a sparse approximation to a distribution in the Wasserstein space.

Optimization Landscape Of Neural Network:
Advisor: Liwei Wang 2018.3–Now
Collaborator: Tianle Cai, Siyu Chen

- Bounding the gap between local minima and global minima.
- Analyzing the adversarial examples under the setting of using stochastic gradient descent learning a deep neural network.
- Bounding the generalization gap of adversarial learning.

SKILLS

Computing Skills: C++, Python, Matlab LaTeX, Pytorch, Mxnet.
Dynamic Systems: Optimal Transport, Optimal Control.
Stochastic Analysis: Stochastic Process, Stochastic Analysis.
Numerical Algorithms: Numerical PDE, Optimization.

SELECTED COURSE

Geometry1(Honor)	3.96/4	Mathematical Image Processing	3.95/4
Topology	3.94/4	Probability theory(Honor)	3.97/4
Statistical Learning	3.98/4	Seminar on Analysis	3.99/4
Bayesian Theory and Computation	3.93/4	Topics in Modern Information Processing	3.97/4
Computer Graphics	3.92/4	Machine Learning	3.99/4

HONORS AND AWARDS

DTZ/Cushman & Wakefield Scholarship 2015-2016
Junyuan Scholarship 2018-2019
Merit Student in PKU (top 5%) 2015-2016,2018-2019
The elite undergraduate training program of Pure Math 2016-present
The elite undergraduate training program of Applied Math 2017-present