Senwei Liang

Mathematics PhD Candidate

liang339@purdue.edu

Semantic shcolar, Google shcolar, Github   Personal Page

Research direction

My interest is mathematics of machine learning with applications in solving differential equations.

Education

- **Purdue University**   West Lafayette, USA
  PhD Candidate. Advisor: Prof. Haizhao Yang   Dec. 2019 – onwards

- **National University of Singapore**   Singapore, Singapore
  Master of Science. Advisor: Prof. Haizhao Yang   Aug. 2017 – Dec. 2019
  - **GPA**: 4.86/5.0;
  - **Core Curriculum**: Graduate Analysis (A+), Optimization (A+), Computational Mathematics (A+).

- **Sun Yat-Sen University**   Guangzhou, China
  Mathematics and Applied Mathematics, Bachelor of Science. Advisor: Prof. Lihua Yang   Aug. 2013 – Jun. 2017
  - **GPA**: 4.40/5.0; **Synthesizing grade ranking**: 1/102;
  - **Core Curriculum**: Analysis (98/100), Algebra (97/100), Geometry (99/100), Ordinary Differential Equation (98/100), Probability Theory (98/100), Real Analysis (97/100), Complex Analysis (100/100).

Internship

- **Argonne National Laboratory**   Lemont, USA
  Wallace Givens Associate. Advisor: Prof. Hong Zhang   May 2021 – July 2021

- **Computational Medical Imaging Laboratory**   Guangzhou, China
  Research Assistant. Advisor: Prof. Yao Lu   June 2016 – January 2017

Publications And Manuscripts

1. **S. Liang**, Z. Huang, H. Zhang, Stiffness-aware neural network for learning Hamiltonian systems. Submitted. [PDF] (First author)

2. Y. Gu, J. Harlim, **S. Liang**, H. Yang, Stationary Density Estimation of Itô Diffusions Using Deep Learning. Submitted. [PDF] (Alphabetical order)

3. **S. Liang**, S. W. Jiang, J. Harlim, H. Yang, Solving PDEs on Unknown Manifolds with Machine Learning. Submitted. [PDF] (First author)

4. **S. Liang***, L. Lyu*, C. Wang, H. Yang, Reproducing Activation Function for Deep Learning. Submitted. [PDF] (Joint first author)

5. Z. Huang*, **S. Liang***, M. Liang, W. He, H. Yang, Efficient Attention Network: Accelerate Attention by Searching Where to Plug. Submitted. [PDF] [Code] (Joint first author)

6. J. Xue, N. Jiang, **S. Liang**, Q. Pang, T. Yabe, S.V. Ukkusuri, J. Ma, Urban road network homogeneity reveals maturity and inheritance of cities. Submitted. [PDF] [Code]

7. J. Harlim, S. W. Jiang, **S. Liang**, H. Yang, Machine Learning for Prediction with Missing Dynamics. Journal of Computational Physics 428, 109922. [PDF] (Alphabetical order)

8. W. He, Z. Huang, M. Liang, **S. Liang**, H. Yang, Blending Pruning Criteria for Convolutional Neural Networks. International Conference on Artificial Neural Networks, 3-15. [PDF]

9. Z. Huang, **S. Liang***, M. Liang and H. Yang, DIANet: Dense-and-Implicit Attention Network. Proceedings of the AAAI Conference on Artificial Intelligence 2020. [PDF] [Code] (Joint first author)

10. **S. Liang***, Z. Huang, M. Liang and H. Yang, Instance Enhancement Batch Normalization: An Adaptive Regulator for Batch Noise. Proceedings of AAAI Conference on Artificial Intelligence 2020. [PDF] [Code] (Joint first author)

11. **S. Liang**, Y. Khoo, H. Yang, Drop-Activation: Implicit Parameter Reduction and Harmonic Regularization. Communications on Applied Mathematics and Computation, 1-19. [PDF] [Code] (First author)

Awards

- Ross-Lynn fellowship, Purdue University, 2021-2022.
- Top Graduate Tutors for AY2019/20 (SGD 100), Department of Mathematics, NUS.
- 2020 Thirty-fourth AAAI Conference Scholarship (USD 100).
- 2015-2016 Samsung Scholarship (CNY 5000), awarded by Samsung.
- 2013-2014 National Scholarship (CNY 8000), awarded by Ministry of Education of China.
- 2013-2014, 2014-2015, 2015-2016 Outstanding Student Scholarship (CNY 2000), awarded by SYSU.

Invited Presentation in Conference and Workshops

- Solving PDEs on Unknown Manifolds with Machine Learning, AMS Sectional meeting, Purdue University, March 2022
- Solving PDEs on Unknown Manifolds with Machine Learning, Joint Mathematics Meetings, Seattle WA, Jan 2022
- Solving PDEs on Unknown Manifolds with Machine Learning, 4th Annual Meeting of the SIAM Texas-Louisiana Section, UTRGV, South Padre Island, Texas, Nov 2021,
- Solving PDEs on Unknown Manifolds with Machine Learning, SIAM Southeastern Atlantic Section Conference, Auburn University, Sep 2021
- Solving PDEs on Unknown Manifolds with Machine Learning, IMA Workshop on the Mathematical Foundation and Applications of Deep Learning, Purdue University, Aug 2021
- DIANet: Dense-and-Implicit Attention Network, Conference on "Thirty-Forth AAAI Conference on Artificial Intelligence", New York USA, Feburary, 2020.
- Instance Enhancement Batch Normalization: An Adaptive Regulator for Batch Noise, Conference on "Thirty-Forth AAAI Conference on Artificial Intelligence", New York USA, Feburary, 2020.
- Regularization Methods of Deep Learning for Image Classification, Workshop on "High-Dimensional Learning and Computation in Physics", National University of Singapore, Singapore, June, 2019.

Programming Skills

- **Languages**: Python (PyTorch, TensorFlow), MATLAB, LaTeX

Contributed Packages

- **Self-attention Network for Image Classification** [Repository]

  ○ **Description**: in this repository, we collect some popular and effective attention models used to boost the performance of neural networks on image classification. For example, DIANet, IEBN, EAN.

Academic Service

- **Service**

  ○ **Conference Reviewer**:
  2022, 2021 Conference on Computer Vision and Pattern Recognition;
  2021 AAAI Conference on Artificial Intelligence;
  2021 International Conference on Artificial Neural Networks;
  2020 Conference on Mathematical and Scientific Machine Learning.
  ○ **Journal Reviewer**:
  Journal of Scientific Computing (JOMP).
  ○ **Organizer**:
  AMS Sectional meeting, Purdue University, March 2022;
  4th Annual Meeting of the SIAM Texas-Louisiana Section, Nov 2021.
  ○ **Assistant**:
  IMA Workshop on the Mathematical Foundation and Applications of Deep Learning, Purdue University, Aug 2021.