Zhao DING

Information

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Profile

Computational Mathematics PhD candidate at Wuhan University. Expect to enter the job market in 2025. Working on ***solving PDE by deep learning*** & ***diffusion model based generation***. With 4 years of experience in scientific computing and 2 years in generative learning.

Education

- **PhD, 2020-present**
  Computational Mathematics
  Wuhan University
- **BSc, 2016-2020**
  Mathematics and Applied Mathematics
  Wuhan University

Skill

- **Python**
  scientific computing
  numpy, scipy, matplotlib, seaborn …
- **PyTorch**
  data parallelism training/inference
- **MATLAB**
  scientific computing
- **C/C++**
  basic scientific computing
- **English**
  CET4 (620) CET6 (625) IELTS (6.5)

Award

- SIAM Award for Student Chapter at Wuhan University, 2024
- First Prize of China Undergraduate Mathematical Contest in Modeling, 2018

Recent Work

Working on new ***one-step*** generation scheme derived from diffusion models, exploiting the deterministic nature of ODE, achieving *SOTA* results among methods of the same kind. Participated in algorithm design and numerical implementation.

Publication

- Zhao Ding, Chenguang Duan, Yuling Jiao, Ruoxuan Li, Jerry Zhijian Yang and Pingwen Zhang (2024). Characteristic Learning for Provable One Step Generation. arXiv:2405.05512.
- Zhao Ding, Chenguang Duan, Yuling Jiao and Jerry Zhijian Yang (2024). Semi-Supervised Deep Sobolev Regression: Estimation, Variable Selection and Beyond. arXiv:2401.04535.
- Jinyuan Chang, Zhao Ding, Yuling Jiao, Ruoxuan Li and Jerry Zhijian Yang (2024). Deep conditional distribution learning via conditional Föllmer flow. arXiv:2402.01460.
- Zhao Ding, Yuling Jiao, Xiliang Lu, Jerry Zhijian Yang and Cheng Yuan (2023). Sampling via Föllmer Flow. arXiv:2311.03660.
- Zhao Ding, Junjun Huang, Yuling Jiao, Xiliang Lu and Jerry Zhijian Yang (2020). Robust decoding from binary measurements with cardinality constraint least squares. *In press with Communications in Computational Physics*.
- Mo Chen, Zhao Ding, Yuling Jiao, Xiliang Lu, Peiying Wu and Jerry Zhijian Yang (2023). Convergence analysis of PINNs with Over-parametrization. In press with *Communications in Computational Physics*.

Experience

- **Teaching Assistant, Wuhan University, 2021**
  Numerical tutorials in MATLAB for “Numerical Linear Algebra”.
  Project page: github.com/burning489/2021_autumn_numerical_linear_algebra
- **Member of Projects, Wuhan University & Huawei, 2020-2024**
  - *Machine* Learning Library
    Develop SVD, PCA, LDA and ARMA, with performance comparable to (partially better than) scikit-learn and statsmodels.
  - Vector Statistical Library
    Develop 1st-4th original & central SUM and MOM statistical functions.
  - MindX Models
    Implement of FNO & PINO (operator networks) in native MindSpore.
  - Math Function Library with High Precision
    Develop interval algorithms with arbitrary precision, built upon mpfr library, in object oriented style, for testing basic math functions at any precision.
  - Derivative Constrained Path Fitting
    Develop B-spline fitting algorithm under 1st-3rd derivative constraints.
  - Sparse Matrix Solver
    Design the architecture for sparse Cholesky decomposition and develop the symbol factorization part. Reach comparable performance compared to C library CHOLMOD.
- **Invited Talks**
  - “Sampling via Föllmer Flow” at the student chapter of the 21st China Society for Industrial and Applied Mathematics (CSIAM) conference, 2023.
  - “ODE-based Sampling and Generative Models” at the student chapter of the 17th East Asia Section for Industrial and Applied Mathematics (EASIAM) conference, 2024.