Zihao Deng

zihao.deng@wustl.edu Linkedin Page, Google Scholar Page

Professional Profile

- PhD student focusing on machine learning and artificial intelligence with expected 2024 graduation.
- Experienced in creating training pipelines and utilizing mathematical tools for Machining Learning and Artificial Intelligence.

Employment and projects

Research Assistant at Washington University 2016 – Present

Machine learning and artificial intelligence research. Superviosr: Brendan Juba, PhD

- Cooperated with Google Research and developed a framework of deep learning modules to leverages pre-learned knowledge in image classification such as MNIST, Fashion MNIST, CIFAR, and improved accuracy.
- Refined Transformer based Natural Language Processing models and applied them to Wall Street Journal sentences to extract high level descriptive information and achieved accuracy improvement in the tagging of semantic components.
- Used tensor method to learn the effect of agent's actions to guarantee safety of the plan, with application to IPC tasks including Parking, Satelite, and Transport Planning.
- Used convex optimization to develop an efficient decision making algorithm for Reinforcement Learning agent working in a space which is exponentially large, with application to tasks such as administration network.

Teaching Assistant at Washington University 2019 – 2019

Advanced Algorithms. Supervisor: Jeremy Buhler, PhD

- Course lecturer: Scheduling Algorithm; Minimum Spanning Tree Algorithm
- Led recitation for graduate students

Research Assistant at University of Vermont 2015 – 2016

Stability of numerical computation for Differential Equations. Supervisor: Taras Lakoba, PhD

- Discovered that, in contrast to previous belief, non-periodic boundary condition can render computation stable for certain differential equations with specific numerical methods where periodic boundary condition can cause instability.

Teaching Assistant at University of Vermont. 2014 – 2015

College Algebra, Supervisor: Jun Yu, PhD

- Course lecturer

Technical Skills

OS: Windows, Mac, Linux, Cloud Computing

Programming Languages: Python, PyTorch, MATLAB, C/C++, Java, SQL, Bash, Docker

Libraries: Sklearn, Numpy, Pandas, Scipy.

Education

Ph.D. in Computer Science and Engineering Expected graduation date: June 2024

Washington University in St. Louis

* Graduate Coursework: Advanced Machine Learning, Adversarial Machine Learning, Algorithms for Nonlinear Optimization, Artificial Intelligence, Bayesian Methods for Machine Learning, Cloud Computing with Big Data Optimization, Data Mining, Multi-agent Systems, Theory of AI and Machine Learning.

M.S. in Applied Mathematics Graduated at 2016

University of Vermont

* Graduate Coursework: complex systems, differential equations, Fourier analysis, mathematical modeling, mathematical biology, numerical analysis.

B.S. in Computer and Information Science Graduated at 2014

Nanjing University of Information Science and Technology

Publications

Polynomial Time Reinforcement Learning in Factored State MDPs with Linear Value Functions - Zihao Deng, Siddartha Devic, Brendan Juba. Proceedings of the 25th International Conference on Artificial Intelligence and Statistics (AISTATS) 2022.

Provable Hierarchical Lifelong Learning with a Sketch-based Modular Architecture - Zihao Deng, Zee Fryer, Brendan Juba, Rina Panigrahy, and Xin Wang. The 39th International Conference on Machine Learning (ICML) 2022 Workshop on Dynamic Neural Networks.

Syntactically restricted self-attention for Semantic Role Labeling - Zihao Deng, Sijia Wang, Brendan Juba. Appeared in EMNLP Workshop on Structured Prediction for NLP, 2020.

Stability analysis of the numerical Method of characteristics applied to a class of energy-preserving hyperbolic systems. Part I: Periodic boundary conditions - Taras Lakoba, Zihao Deng. J. Comput. Appl. Math. 356(2019): 67-80.

Stability analysis of the numerical Method of characteristics applied to a class of energy-preserving hyperbolic systems. Part II: Nonreflecting boundary conditions - Taras Lakoba, Zihao Deng. J. Comput. Appl. Math. 356 (2019): 67-80.

Some Refinements of the Weighted Ostrowski's Inequality for Functions of Bounded Variation and Applications - Wenjun Liu, Zihao Deng. Mathematical Theory and Applications, 2014

Patents

A Input system and input method of special characters- Wenjun Liu, Kexiang Jiao, Yuyi Liang, Zihao Deng, Xiang Yun, Jiabing Wang. Filing date: 2013-03-15 , Issue date: 2013-06-26. CN103176604.

Operation exercise correction and feedback method- Wenjun Liu, Kexiang Jiao, Yuyi Liang, Zihao Deng, Xiang Yun, Jiabing Wang. Filing date 2013-03-15, issue date: 2015-01-07. CN103164994B.