Hao Ji

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Education

Ph.D Mechanical Engineering, University of Southern California, 08/2021 GPA: 4.0/4.0

M.Eng Mechanical Engineering, University of California at Berkeley, 05/2014 GPA: 3.8/4.0

B.Eng Mechanical Engineering, Donghua University, Shanghai, 07/2013 GPA: 3.7/4.0

Work Experience

9/2021-Current **Data Scientist**, University of Southern California, Center for Advanced Research Computing, Los Angeles, CA

- Developed and optimized distributed GPU training algorithms using PyTorch, improving efficiency in data parallel processing.
- Utilized surrogate model algorithms to optimize SLURM job configuration paramters
- Benchmarked and compared deep learning training algorithms across various GPU models (A100, A40, V100, P100).
- Conducted storage performance benchmarking on Samsung SHIPs & Vast storage systems using ML Perf storage benchmark codes
- Supported hybrid cloud virtual machine setups, enhancing virtual environments for research purposes
- Built and maintained Singularity containers for reproducible research, ensuring consistency across computing environments.
- Led deep learning workshops and summer bootcamps, educating students on building neural networks and running jobs in HPC environments.
- Tested and optimized data transfer speeds using bbcp and iperf3, enhancing Science-DMZ DTN performance
- Developed and taught USC Viterbi Class ITP450: 'High Performance Computing in Applied Machine Learning'
- Build software packages on the cluster using spack
- Prepared new class teaching material for department of data science at USC on advanced computing and deep learning/AI topics: Large Language Models, Convolutional Neural Networks and etc.

8/2015-8/2021 **Research Assistant**, University of Southern California, IMPACT lab, Los Angeles, CA

- Implemented multi-agent independent dueling DQN algorithms and achieved autonomous multi-agent box-pushing and self-assembly tasks in a game simulator (Pygame) environment
- Ran multiple simulations simultaneously using parallel shell command and used matplotlib package to visualize results
- Generated research findings on stability and scalability of multi-agent deep reinforcement learning to various team sizes and proposed effective entropy measurement to predict optimal team sizes without training the agents
- Analyzed sensitivity of self-organizing system performance regarding weights of reward with different types of tasks

5/2019-8/2019 **Data Scientist Intern,** Procter & Gamble, Cincinnati, OH

- Developed parallel code to extract images from videos based on timestamp information using OpenCV
- Generated key points of 18 body parts using tf-openpose and cropped images based on keypoints
- Trained Mobilenet/Resnet to generate zone prediction based on image dataset of 600GB and ground truth labels
- Used trained Resnet50 to generate feature vectors of 2048 as dataset and pushed to bidirectional GRU model for time-series training
- Combined image & sensor dataset, ensemble two separate bi-directional RNN predictions to auto-label image and sensor data
- Increased current auto-label performance by 7%

Awards and affiliations

- Provost's Fellowship of University of Southern California
- Volunteer of 2010 World Expo
- Volunteer of 2011 World Swimming Championship
- Torchbearer of 2008 Olympic Games
- National Merit Scholarship by Chinese government (Top 1%)
- Shanghai Excellent Student Award (Top 3%)
- Reviewer of Journal AI EDAM (Artificial Intelligence for Engineering Design, Analysis and Manufacturing)
- Reviewer of Journal Smart Energy
- Reviewer of Journal Building Engineering (Q1, Top Journal)
- Reviewer of Journal Automation in Construction (Q1, Top Journal)
- Reviewer of Journal Computer Aided Design (Top Journal in the field)
- Reviewer of Journal of Mechanical Design (Top Journal in the field)
- Reviewer of Journal PLOS ONE
- Reviewer of Journal Neural Processing Letters
- Reviewer of International Journal of Machine Learning and Cybernetics
- Review of Journal Discover Artificial Intelligence
- Reviewer of ASME IDETC Conference 2022 - 2024
- Reviewer of PEARC Conference 2024
- Editorial Board Member of Journal Mathematics and Computer Science
- Participated in NSF CyberTraining Program, awarded 300k USD
- Participated in NSF Hybrid Cloud Platform, awarded 300k USD
- Participated in NSF Grant: Regional Computing Program, awarded 1million USD

Publications

1 Sabelhaus, Andrew P., Ji, Hao et al. "Mechanism design and simulation of the ULTRA spine: a tensegrity robot." ASME 2015 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference. American Society of Mechanical Engineers, 2015.

2 Ji, Hao, Jin, Yan. "Adoption of Social Rules in Teams of Different Sizes". Engineering Management Reviews, 2017, 6(1), 6-15. doi: 10.14355/emr.2017.0601.002

3 Ji, Hao and Yan Jin. "Modeling trust in self-organzing systems with heterogeneity." ASME 2018 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference. American Society of Mechanical Engineers, 2018.

4 Ji, Hao, and Yan Jin. "Designing Self-Organizing Systems with Deep Multi-agent Reinforcement Learning." ASME 2019 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference. American Society of Mechanical Engineers, 2019.

5 Ji, Hao, and Yan Jin. "Designing Self-Assembly Systems with Deep Multi-agent Reinforcement Learning. "Design Computing and Cognition, 2020

6 Ji, Hao, and Yan Jin. "Evaluating the Learning and Performance Characteristics of Self-organizing Systems with Different Task Features." AIEDAM Artificial Intelligence for Engineering Design, Analysis and Manufacturing, 2021

7 Ji, Hao, and Yan Jin. "Knowledge Acquisition of Self-Organizing Systems with Deep Multiagent Reinforcement Learning." ASME Journal of Computing and Information Science in Engineering. American Society of Mechanical Engineers, 2022 **(Journal Spotlight of JCISE Journal at IDETC 2022 Conference)**

8 Ji, Hao, and Yan Jin. "Impact of Task Constraint on Agent Team Size of Self-Organizing Systems Measured by Effective Entropy." ASME Journal of Computing and Information Science in Engineering. American Society of Mechanical Engineers, 2024

9 Huang Bingling, Ji Hao, and Yan Jin. "Impact of Social Learning on Teamwork Efficiency in Learning-Based Self-Organized Systems." ASME 2024 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference. American Society of Mechanical Engineers, 2024