Jiarui Fang

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OBJECTIVE: Research Scientist and Software Engineer about **High Performance Computing** and **Deep Learning**.

Education

- **University of California, Davis** Davis, CA, USA
  Visiting Scholar at Department of Computer Science Engineering *August 2017 - current*
  Advised by Assistant Prof. Cho-Jui Hsieh [🔗]

- **Tsinghua University** Beijing, China
  Ph.D. Candidate at Department of Computer Science & Technology *September 2014 - current*
  Advised by Prof. Guangwen Yang [🔗], and Associate Prof. Haohuan Fu [🔗]

- **Beijing University of Posts and Telecommunications** Beijing, China
  B.S. at Department of Computer Science & Technology *September 2010 - June 2014*
  Ranking 6^{th} **top 2%** among 300 students and graduated with honor.

Research Highlights

- **Communication-efficient Distributed Deep Learning Training Method**
  UC Davis *September 2017 - Now*

  Scaled and benchmarked deep neural network (DNN) models on Piz Daint (P100 GPU) and Cori (Intel Knights Landing) Supercomputers with Tensorflow, Horovod and Intel-Caffe. Designed sparse collective communication operations to apply gradient pruning and gradient compression to optimize communication in large-scale DNN implementations.

- **High Performance Deep Learning Framework for the Sunway TaihuLight**
  National Supercomputer Center in Wuxi *April 2016 - August 2017*

  Designed the swCaffe [git] – an MPI-based deep learning framework on the Sunway TaihuLight, which took **No.1 ranking on the 47th - 50th Top500 Supercomputer lists**.
  Designed the swDNN [git] – a highly-efficient library for deep neural networks based on Sunway TaihuLight supercomputer. The swDNN achieved over 1.6 Tflops performance of convolutional layers on single SW20160 processor.

- **High Performance Seismic Imaging Software on GPU and Xeon Phi**
  China National Petroleum Corporation *November 2014 - November 2015*

  Proposed a generalized cache-friendly design for complex spatially-variable coefficient (CSVC) stencils on NVIDIA GPUs and Intel Xeon Phis, which can largely reduce cache miss times and cache space consumption. Around 4x speedup was gained compared with traditional methods. Integrated GPU-based CSVC stencil implementations with our cache-friendly design into the GeoEast-Lightning [🔗] seismic exploration software.

- **High Performance Scientific Computing Applications**
  Department of Earth System Science, Tsinghua University *February 2014 - March 2016*

  Accelerated a serial of scientific applications on HPC platforms. Works included : Transient Electromagnetic Simulation on CPU cluster; Remote Sensing data analysis with SVM on Intel Xeon Phi; Community Earth System Model (CESM) and Crop Modeling on the TaihuLight.

Publications

- Li, L.*, **Fang, J.***(* equal contribution),Fu H, et al. swCaffe: a Parallel Framework for Accelerating Deep Learning Applications on Sunway TaihuLight, In submission to 38th ICDCS, [preprint].
- Zhao W, Fu H, **Fang J**, et al.. Optimizing Convolutional Neural Networks on Sunway TaihuLight Supercomputer, ACM Transactions on Architecture and Code Optimization (TACO). [pdf]
- **Fang J**, Fu H, Zhao W, et al.. swDNN: A Library for Accelerating Deep Learning Applications on Sunway TaihuLight Supercomputer, 31st IEEE International Parallel & Distributed Processing Symposium (IPDPS 17'), Orlando, USA, 2017 [pdf]
- Li, L., **Fang, J.**, Jiang J., et al.. SW-AES: Accelerating AES Algorithm on the Sunway TaihuLight, The 15th IEEE International Symposium on Parallel and Distributed Processing with Applications (ISPA 17'), Guangzhou, China, 2017 [pdf]
- Li, W., Fu, H., You, Y. Yu, L. **Fang, J.**. Parallel Multi-class Support Vector Machine for Remote Sensing Data Classification on Multi-Core and Many-Core Architectures, IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, 10.1109/JSTARS.2017.2713126 [pdf]
- **Fang J**, Fu H, Yang G. : Cache-friendly Design for Complex Spatially-variable Coefficient Stencils on Many-core Architectures. IEEE 23rd International Conference on High Performance Computing, Data, and Analytics (HiPC 16'),p222-p231, Hyderabad, India, 2016. [pdf]
- Fu, H., et al: Refactoring and optimizing the community atmosphere model (CAM) on the sunway taihulight supercomputer. Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis (SC 17'), 2016 [pdf]
- **Fang J**, Fu H, Zhang H, et al., : Optimizing Complex Spatially-Variant Coefficient Stencils for Seismic Modeling on GPU. IEEE 21st International Conference on Parallel and Distributed Systems (ICPADS 15'), p641-p648 Melbourne, Australia, 2015. [pdf]
- **Fang J**, Fu H, Yang G, et al.: GPU-based explicit time evolution method. The 84th Society of Exploration Geophysicists Technical Program Expanded Abstracts (SEG 15'), p3549-p3553, New Orleans, USA, 2015 [pdf]
- Fu, H., Wang, Y., Um, E. S., **Fang, J.**, et al.. A parallel finite-element time-domain method for transient electromagnetic simulation. Geophysics, 80(4), E213-E224, (2015) [pdf]

Competition Awards

2013 2nd Prize of Freescale Cup National Intelligent Car Competition in Northern China
2013 The Honorable Mentioned of the Interdisciplinary Contest in Modeling
2013 2nd Prize of Beijng City undergraduate electronic design contest

Scholarship Awards Selected

2017 The Scholarship of CreditEase
2017 The IEEE TCPP grant for IPDPS 2017
2017 The Scholarship of Schlumberger
2016 The Scholarship of Tung Oocl
2012-2013 The scholarship of Nandu Trade Co.
2011-2012 The National Scholarship of the Ministry of Education.
2010-2011 The Fisrt Class Scholarship of Beijing Univ. of Post and Telecomm.

Skills

- **Proficiency in English:** GRE 322 (Verbal 153, October 2012), CET-6 (591)
- **Programing Language:** Python, C/C++, Assembly, Matlab, CUDA, MPI
- **Deep Learning Frameworks:** Familiar with Caffe source code, Good knowledge of Tensorflow