Zirui Tao

Electrical and Computer Engineering
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EDUCATION

University of Wisconsin-Madison Sep 2018 - Dec 2019
Master of Science - Electrical Engineering Madison, WI
GPA: 3.842/4.00

University of Wisconsin-Madison Aug 2014 - June 2018
Bachelor of Science - Computer Engineering, Computer Sciences Madison, WI

RESEARCH

Research Assistant - Professor Vikas Singh's Group March 2017 - May, 2019
University of Wisconsin - Madison Madison, WI

- Conducted research projects regarding medical imaging and computer vision with Professor Vikas Singh.
- Published a paper abstract and coauthored one paper abstract on Alzheimer's Association International Conference (AAIC 2019).
- Coauthored one paper to Computer Vision and Pattern Recognition 2018 (CVPR 2018) and one paper to International Conference on Computer Vision 2019 (ICCV 2019).

Research Assistant - Professor Irene Ong's Group April 2017 - February 2018
Wisconsin Institute of Medical Research Carbone Cancer Center Madison, WI

- Compared a variety of inference models including AdaboostM1, ctree, random forest and associated parameter settings and performed hyperparameter search on each model, for the prediction of Head and Neck patients' overall survivals from imaging and genomic data.

Lab Assistant Fall 2016 - Fall 2017
Parks Laboratory Madison, WI

- Designed the Epistasis Analysis pipeline for million-scale gene interdependence hypothesis testing for the Center for High Throughput Computing at UW-Madison and reduced the computational time by a factor of 100.
- Led the complete lifecycle of the analytical application of query analysis and rich interactive graphics for the visualization of large structured biological datasets.

PUBLICATION

Seong Jae Hwang, **Zirui Tao**, Won Hwa Kim, Vikas Singh, "Conditional Recurrent Flow: Conditional Generation of Longitudinal Samples with Applications to Neuromaging", International Conference on Computer Vision (ICCV), 2019. [Acceptance rate: 25%][conference version to be updated][arXiv]

Seong Jae Hwang, Sathya N. Ravi, **Zirui Tao**, Hyunwoo J. Kim, Maxwell D. Collins, Vikas Singh, "Tensorize, Factorize and Regularize: Robust Visual Relationship Learning", Computer Vision and Pattern Recognition (CVPR), 2018. [Acceptance rate: 29.7%] [paper][code][poster]

PRESENTATION

Zirui Tao, Ronak R. Mehta, Seong Jae Hwang, Rebecca L. Koscik, Erin Jonaitis, Sterling C. Johnson, Vikas Singh,"A Normative Modeling Based Analysis of Amyloid, Cognition, and Tau in Preclinical Alzheimer's Disease", Alzheimer's Association International Conference (AAIC), 2019. [poster]

Seong Jae Hwang, Rebecca L. Koscik, Tobey J. Betthauser, **Zirui Tao**, Won Hwa Kim, Sterling C. Johnson, Vikas Singh,"Predicting amyloid accumulation trajectories in a risk-enriched Alzheimer's disease cohort with Deep Conditional Neural Networks", Alzheimer's Association International Conference (AAIC), 2019.

WORKSHOP

The 1st Workshop on Statistical Deep Learning in Computer Vision 2019. (Oral)

INTERNSHIP

Summer Software Engineering Intern (Manager: Benoit Steiner) Summer 2019
System ML team, Facebook AI Research Menlo Park, CA

- Improved the cost model accuracy by 20 percent from the paper "Learning to Optimize Halide with Tree Search and Random Programs", by Adams et al., to improve the Halide auto-schedulings results.
- Designed the ONNX model generation pipelines and co-designed Caffe2 to ONNX conversion pipelines.
- Augmented the Halide scheduling vs runtime dataset generation by expanding the Halide implementation on ONNX from ONNX opset to object detection architectures.

RELATED COURSEWORK

Mathematics and Statistics
Real Analysis, Approximation Algorithm, Statistical Learning Theory, Advanced Algorithms, Convex Analysis, Linear Programming, Stochastic Process, Matrix Calculus, Linear Algebra, Theory of Probability, Signal Processing, Discrete Mathematics, Differential Equations
Machine Learning
Mathematical foundation of Machine learning, Matrix Methods in Machine Learning, Deep Neural Networks
Computer Hardware and Computer Science
Computer Architecture, Data Structures, Mobile Computing

PROJECTS

5-stage pipelined ISA processor design

- Designed 5-stage pipelined processor (IF, ID, EX, MEM, WB).
- Implemented a set of 16-bit ISA specified for a 16-bit data-path with load/store architecture.
- Implemented I-Cache and D-Cache and their controllers that interfaces with IF/MEM pipeline stage and Memory.

Image Captioning Fall 2016 - Fall 2017

- Re-designed a pipeline originally proposed by Vinyals et al. regarding image captioning task using TensorFlow and Keras framework.
- Parallelized the image pre-processing on Amazon EC2 GPU enabled instances.
- Implemented the human-oriented metric "CIDEr" for Microsoft COCO Captioning challenge.

SKILLS

Languages
Python, C/C++, Java, R, SQL, Bash Scripting, Verilog, MATLAB, HTML
Applications/Frameworks
Pytorch, Halide, TensorFlow, CUDA, Keras

SERVICE

Grader
Fall 2019: CS540 Introduction to Artificial Intelligence, UW-Madison