Tri M. Nguyen

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EDUCATION

Princeton University, Princeton, NJ, USA — Sep 2012 – Sep 2018
Doctor of Philosophy (Ph.D.) in Electrical Engineering
Adviser: Professor David Wentzlaff

University of Texas at Austin, Austin, TX, USA — Sep 2008 – May 2012
Bachelor of Science (B.S.) in Electrical and Computer Engineering
Graduated with High Honors.
Cumulative GPA: 3.93 / 4.00

RESEARCH INTERESTS & EXPERTISE

Interests: neuroscience, computer architecture, deep learning

Skills: architectural simulation, RTL design, deep learning frameworks, computing cluster admin

Programming fluency: C, C++ 11, Python, Cython, Java, PyTorch, Tensorflow, Verilog

RESEARCH EXPERIENCE

Harvard Medical School — Sep 2018 – Present
Post-doctoral Research Associate
Cerebellum: Reconstructed a mouse cerebellum connectome at synapse resolution from electron microscopy (EM) data - we sought to understand how specific wirings can give rise to learning and memory. Analyzing >4k neurons and >150k synapses, we found the CNN-like feedforward network to contain structured redundancy that made generalize learning better to input variations.
Neuron segmentation: Developed software frameworks for efficient processing of brain datasets, including *Daisy* (parallel computation), *Segway* (segmentation pipeline), and *MD-Seg* (Neuroglancer-based proofreading platform). Frameworks were successfully used on datasets of different imaging modalities including X-ray, transmission EM, and FIB-SEM. Built and maintained a local computing cluster for running segmentation.
PI: Dr. Wei-Chung Lee (https://lee.hms.harvard.edu)

Princeton University — Sep 2012 – Sep 2018
Research Assistant
Bandwidth compression: Investigated bandwidth starvation of manycore architectures (e.g., GPUs) and solutions including cache compression, link compression, HBM, and efficient memory layout. Work published in *MICRO'15, MICRO'18*.
NVM: Studied nonvolatile memory as a DRAM replacement and novel high performance crash consistency. Work published in *MICRO'18*.
OpenPITON manycore processor: Designed the cache system, cache-coherence protocol, network-on-chip protocol, and JTAG debug-port for PITON, a 25-core academic manycore processor. Verified the design with directed and randomized assembly tests. Synthesized the design with industrial tools (Synopsys) and taped out in IBM 32nm process. *https://parallel.princeton.edu/piton*
PRIME open-source simulator: Developed a C++ distributed parallel and scalable manycore simulator. Added event-driven modeling to simulate bandwidth usage. Added SimPoint support for fast simulation. *https://github.com/PrincetonUniversity/primesim*
Advisor: Professor David Wentzlaff

University of Texas at Austin — Sep 2011 – May 2012
Research Assistant
Advisor: Professor VJ Reddi
Hardware accelerator: Conducted a feasibility study of accelerating drug discovery using FPGA, through studying molecular dynamic algorithm and analyzing the integer/floating point performance of FPGAs.
GPU: Identify and optimize GPU workloads with dynamic compilation through similarity matrices.

WORK EXPERIENCE

NVIDIA Research, Redmond, WA, USA — Jun 2017 – Sep 2017
Research Intern
Investigated and characterized the performance of cutting-edge GPU DNN machine learning algorithms including CNN and LSTM. Devised architectural improvements for future GPUs beyond Volta. Characterized GPU performance as a shared virtual GPU in the cloud. Contributed to the development of the internal GPU simulator widely used in company.
Mentor: Evgeny Bolotin

AMD Research, Boxborough, MA, USA Jun 2016 – Sep 2016
Research Intern
Implemented state-of-the-art hardware compression algorithm for super-computing workloads and evaluated energy savings at the RTL/gate-level. Submitted a patent on a novel compression algorithm specifically designed to reduce data movement energy.
Manager: Greg Sadowski

NVIDIA, Santa Clara, CA, USA May 2012 – Aug 2012
Intern
Wrote data extraction software for on-die oscilloscope and used it to analyze transient voltage spikes as a cause of failure. Improved voltage noise virus testing suite to increase fault coverage and decrease test time.
Manager: Apoorv Gupta

Samsung, Suwon, South Korea May 2011 – Aug 2011
Intern
Investigated the feasibility and benefits of data compression for solid-state drives (SSD), including gzip/DEFLATE, fixed block-based compression, and fingerprinting for variable block-size compression.
Manager: Kyungho Kim

TEACHING EXPERIENCE

DL@MBL: Deep Learning for Microscopy Image Analysis September 2021
Course Facilitator
Taught bio students at the PhD and postdoc level in a 10-day intensive course at the Marine Biology Lab in Woods Hole on how to best integrate deep learning to their work. Worked with a talented team of course facilitators to guide students through the lab sessions and help them apply DL techniques on their own datasets.

Princeton ELE301 – Design of Real Systems Fall 2013 & Fall 2017
Assistant Instructor
Developed lab portion of a new course where we taught Android programming and how to interface such software to microcontrollers. Led weekly lab sessions and designed microcontroller exercises.

NEUROSCIENCE PUBLICATIONS

Tri Nguyen, Logan Thomas, Jeff Rhoades, Ilaria Ricchi, Cindy Yuan, Arlo Sheridan, David Hildebrand, Jan Funke, Wade Regehr, and Wei-chung Allen Lee. *"Structured connectivity in the cerebellum enables noise-resilient pattern separation." bioRxiv* (2021).

Jasper Phelps, David Grant Colburn Hildebrand, Brett J. Graham, Aaron T. Kuan, Logan A. Thomas, **Tri Nguyen**, Julia Buhmann et al. *"Reconstruction of motor control circuits in adult Drosophila using automated transmission electron microscopy." Cell* (2021)

Julia Buhmann, Arlo Sheridan, Caroline Malin-Mayor, Philipp Schlegel, Stephan Gerhard, Tom Kazimiers, Renate Krause, **Tri Nguyen** et al. *"Automatic detection of synaptic partners in a whole-brain Drosophila electron microscopy data set." Nature Methods* (2021)

Arlo Sheridan, **Tri Nguyen**, Diptodip Deb, Wei-Chung Allen Lee, Stephan Saalfeld, Srini Turaga, Uri Manor, and Jan Funke. *"Local shape descriptors for neuron segmentation." bioRxiv* (2021).

Aaron Kuan, Jasper S. Phelps, Logan A. Thomas, **Tri Nguyen**, Julie Han, Chiao-Lin Chen, Anthony W. Azevedo et al. *"Dense neuronal reconstruction through X-ray holographic nano-tomography." Nature Neuroscience* (2020).

COMPUTER ARCHITECTURE PUBLICATIONS

Tri Nguyen, and David Wentzlaff, "*PiCL: a Software-Transparent, Persistent Cache Log for Nonvolatile Main Memory*," *MICRO'18*

Tri Nguyen, Adi Fuchs, and David Wentzlaff, "*CABLE: Cache-based Link Compression for Manycore Architectures*," *MICRO'18*

Tri Nguyen, and David Wentzlaff, "*MORC: Manycore-oriented Cache Compression*," *MICRO'15*

Yaosheng Fu, **Tri Nguyen**, and David Wentzlaff, "*Coherence Domain Restriction on Massive Scale Systems*," in *MICRO'15*

Michael McKeown, Yaosheng Fu, **Tri Nguyen**, Yanqi Zhou, Jonathan Balkind, Alexey Lavrov, Mohammad Shahrad, Samuel Payne, Xiaohua Liang, Matthew Matl, and David Wentzlaff "*OpenPiton: An Open Source Manycore Research Framework*," in *ASPLOS'16*

HONORS & AWARDS

The Edward R. and Anne G. Lefler Fellows, Harvard Medical School — 2020 – 2022
Supports from HMS for my postdoctoral study of the cerebellum.

Student Travel Grant, MICRO'17, ASPLOS'16, ISCA'15, ISCA'14
Supports from ACM, NSF, SIGMICRO, and others.

University Honors, University of Texas at Austin — 2008 – 2012

Third place, Final Project — Dec 2010
EE345L, Embedded Systems Design, UT Austin
Microcontroller as a gaming device with impressive 3D capability

First place in tank simulation AI competition. — Dec 2009
EE319K, Intro to Embedded Systems, UT Austin

ACTIVITIES

Musical MelodEE, Princeton EE department — Mar 2017
Organizer

Eta Kappu Nu Honors Society, UT Austin — Sep 2010 – May 2012
Member

Shotokai Karate Club, UT Austin — Sep 2008 – May 2010
Member then vice-president

Last updated: December 2021