Yiheng Xu

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EDUCATION

School of Letter & Science, University of Wisconsin-Madison, WI, US **09/2018–05/2020**
Major 1: Computer Science. Major 2: Applied Mathematics GPA: 4.0/4.0

School of Computer Science, Wuhan University (WHU), Wuhan, China **09/2016–07/2018**
Major: Computer Science GPA: 3.97/4.0
National Scholarship, Wuhan University 10/2017

Berkeley Global Access Program, University of California-Berkeley Extension, CA, US **08/2017–12/2017**
Study Field: Computer Science GPA: 4.0/4.0

WORK EXPERIENCE

Institute of Computing Technology, Chinese Academy of Science, Beijing, China **06/2019–09/2019**
Algorithm Engineering Intern — Development of a high performance real FFT library on x86 CPUs

- Optimized existing assembly code based on x86 architecture by revising memory allocation, address computation, and cache usage, and implemented the core "split" function for both single and double precision floating point
- Found out the reason for low performance of the code, and reformed the code using SIMD, loop unrolling, as well as multi-thread programming
- Designed a faster REDFT00 sub-transform algorithm of R2R transform that reduced computational complexity, and wrote a mathematical proof of it
- Realized the algorithm in our library, by which the performance on large scale of data exceeded the corresponding performance of MKL and FFTW

Computer Science Department, UW-Madison, Madison, WI, US. **01/2019–05/2019**
CS 577 (Introduction to Algorithm) Peer Mentor

- Led weekly review sessions through lecture materials and guided student through teaching practice problems
- Advised students with their specific questions during individual help sessions and provided feed-backs
- Designed practice problems and answered questions on Piazza

RESEARCH EXPERIENCE

Directed Study, UW-Madison **09/2019–Present**
Accelerating Deep Learning Inference Using GPU **Supervisor:** A/P Shivaram Venkataraman
Goal: To realize new machine learning method on GPU and use parallel programming to best support the method

- Applied parallel programming to DNN with CUDA, and implemented forward pass and back propagation for fully connected DNNs on GPU
- Analyzed concurrent execution by changing the size and the weight of the model. Did research on the performance and concurrency impact from varying the number of thread blocks and kernels
- Tested running multiple GPU kernels with different sizes in CIFAR-10 training. Assigned various grid sizes to each kernel and found the best grid size combination that leads to the shortest running time.

Programming Assistant, madPL Lab, UW-Madison **09/2019–Present**
RFixer Web Application Development **Supervisor:** A/P Loris D'Antoni
Goal: To build a web application for RFixer that provides a friendly UI and a back-end linked to the program to fix regex

- Learned web programming and regex fixing mechanism
- Designed a clean UI that collects user's input and gives active interaction using React and JavaScript ES6
- Built a back-end server using Spring and Maven to talk to the program to fix the regex
- Optimized the application so that it could provide some matching information before running the whole server program

System Security Lab, Wuhan University **03/2018–07/2018**
Research on Voice Command System Security **Supervisor:** Prof. Qian Wang
Goal: To create voice command attack that cannot be detected by human ears but can be received by machines

- Did research on current voice command attacking and defending mechanisms, and involved in the synthesis of current

methods to create more effective attacking approach
- Engaged in the development of human-undetectable voice command attack. Mainly responsible for collecting data, unit tests, and performance analysis

PROJECTS

Virtual Network Development **09/2019–Present**
CS 640 Introduction to Computer Networks, UW-Madison
Developed a virtual network with virtual switch and router where various protocols implemented
- Built an application that measures the latency and throughput of the network by socket programming
- Performed MAC learning on the virtual switch, and enabled switches and routers to handle and forward packets
- Implemented ICMP, ARP, and RIP protocols on the virtual router so that the router could build ARP cache and routing table automatically, and send error message correctly
- Developed SDN that dynamically configured the routing, and balanced the load in the network

XV6 Operating System Optimization **01/2019–05/2019**
CS 537 Introduction to Operating System, UW-Madison
Optimized xv6 (a simple operating system for teaching purpose) to a more powerful operating system
- Reconstructed the process scheduler from FIFO to Round-Robin and rearranged user process virtual memory space
- Supported sharing memory between different processes and the system call to create new shared pages
- Enabled kernel thread in the operating system
- Added a file system checker and fixer that could catch and fix inconsistency in file system

Data Analysis on Winning Probability Prediction and Winning Cause of the Game **11/2018**
"MadHacks" Hackathon Programming Competition, UW-Madison
Produced an application that predicted the likelihood for a player to win based on his gaming style
- Used Excel and Matlab skills to analyze millions of player records
- Performed PCA on the huge feature space to do dimension reduction
- Trained a regression model with the processed data, and then made predictions by using the trained model

ACTIVITIES & LEADERSHIP EXPERIENCE

Volunteer, Student Today Lead Forever, UW-Madison **03/2019**
Took part in a volunteering trip that did various volunteer activities in different cities
- Assisted an environmental organization to clean up invasive species in Louisville, Kentucky
- Helped a local special children's school take care of the courtyard in Asheville, North Carolina
- Arranged to build an oyster shell reef for a local environmental organization in Charleston, South Carolina

Vice President, Debate Team of School of Computer Science, WHU **09/2017-06/2018**
- Trained new debaters to familiarize debate and lead team to participate in competitions
- First Prize in 2017 Freshmen Debate Competition of Wuhan University; Awarded the Best Debater in many competitions
- Organized the school E-Cup Debate Competition, served as the judge, the host, and the timer in multiple competitions

Organizer, External Relations Department, Student Union of Computer Science School, WHU **09/2016**
- Raised sponsorship for the freshman welcome party and got 2000 yuan sponsorship from a well-known Internet Cafe
- Took charge of the sponsorship planning and contract writing, including advertising programs for sponsors
- Contacted Lenovo, Apple, and the Internet Cafes with the written sponsorship plan and contract

TECHNICAL SKILLS

Programming Skills: Proficient with Java, C, JavaScript, Python; Familiar with C++, SQL, HTML, CUDA, Assembly
Proficients: Mastery of Matlab, programming under Linux, Git, Microsoft Office programs

TEST SCORES

TOEFL (09/28/2019): L: 30; S: 26; R: 28; W: 26. Total:110
GRE (09/07/2019): V: 159; Q: 169; A/AW: 4.0