Xiao Wang

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State Key Laboratory of Computer System and Architecture, Institute of Computing Technology, Chinese Academy of Sciences
Supervisor: Prof. Yunquan Zhang

EDUCATION

- Institute of Computing Technology High Performance Computing Master（Exam Exempt） Sept. 2017-Now
- Yunnan University Computer Science and Technology bachelor Sept.2013-July.2017

RESEARCH BACKGROUND

(1) Implement and Optimize 1~3D Real FFT on ARMv8/X86 CPUs Sept.2017~Oct.2018

- **Client:** Huawei.

Research Content: Design and Optimize 1~3D float/double Real FFT numerical library on ARMv8/X86 CPUs. 1) Design computationally streamlined algorithms for 11 kinds of Real FFT. 2) Optimize Real FFT specific operations with SIMD(Neon/AVX256) on ARM/X86 CPUs.

Optimizing Effect: Achieve 1.34x~1.52x speedup compared with 1D FFTW, 1.10x~1.41x speedup compared with 2D FFTW, competitive performance compared with MKL.

2) Development and Optimize High Performance IPP Library May.2017~Aug.2017

- **Client: Huawei**

Research Content: (1). Develop accuracy benchmark for performance primitives, such as e^x, ln(x), median filter, max operation, min operation, etc. (2). Parallelize and optimize these operations on ARMv8 CortexA57 CPU with intrinsic.

Optimizing Effect: speedup achieved on ARMv8 is comparable with that achieved in X86 compared with the same performance benchmark.

(3) Transplant GEMM on Tianhe-3 Supercomputer FT2000+ CPU Oct.2018~Nov.2018

- **Client: National Supercomputing Center in Tianjin**

Research Content: Tune GEMM performance based on architecture of FT2000+ CPU.
(1). Adjust P, Q, R parameter in block size of matrix multiplication. (2) Manage vector register in different ways, such as 4x4, 16x4, and 8x8. (3) Tune Instruction pipeline.

Optimizing Effect: SGEMM, DGEMM, CGEMM, ZGEMM achieves 94.2%, 94.3%, 87.6%, 95.4% of theoretical peak performance.

INTERNSHIP

(1) Startup PerfxLab (Beijing) Mar.2019-May.2019

Project Background：Design and Optimize multi-boundary Gaussian filter on AMD GPU.

Research Content： Optimize and design multi-boundary conditions Gaussian filter on AMD GPU
(1). Optimize computations: Using SIMD enable single thread solves multi-filter value simultaneously. (2) Optimize data reuse: Take advantage of data reuse among threads within a thread block and a thread. (3). Channel Conflict: Solve channel conflict caused by row-col two-step filter operations by index-remapping.

Optimizing effect: Achieve 1.21x~1.33x speedup compared with counterpart in OpenCV.

(2) Amazon AWS AI Lab (ShangHai) Jun.2019.-Now

- Project ambitions: Developing high performance-numpy compatible operator for MXNet.

Developing operators including sinc, gcd for MXNet, such that these achieve high performance, and the same behavior with counter parts in numpy.

PAPERS

(1). Implementation and Optimization of Multi-dimensional Real FFT on ARMv8 Platform. **Wang Xiao** and Jia Haipeng and Li Zhihao and Zhang Yunquan. International Conference on Algorithms and Architectures for Parallel Processing: 2018 ,338–353. (CCF C; EI).

(2). AutoFFT: A Template-Based FFT Codes Auto-Generation Framework for ARM and X86 CPUs. Zhihao Li, Haipeng Jia*, Yunquan Zhang, Tun Chen, Liang Yuan, Luning Cao, **Xiao Wang**. (CCF A; SC 19, November 17–22, 2019, Denver, CO, USA).

(3). MVUC: An Interactive System for Mining and Visualizing Urban Co-locations. **Xiao Wang**, Hongmei Chen*, Qing Xiao. Conference on Web-Age Information Management 2016, 524-526. (Demo Paper, CCF C; EI).

(4). Efficient parallel optimizations of a high-performance SIFT on GPUs. Zhihao Li and Haipeng Jia and Yunquan Zhang and Shice Liu and Shigang Lia and **Xiao Wang** et al. Journal of Parallel and Distributed Computing: 2019 ,124 ,78 - 91. (JPDC, CCF B; SCI, Impact Factor:1.815).

AWARDS

(1) 2019 Merit Students Awards of University of Chinese Academy of Sciences.
(2) 2017 Outstanding Undergraduate Students Awards of Yunnan Province (Top5%).
(3) 2016 The CCF Outstanding undergraduate award (Select 100 undergraduate students every year from all universities in China).
(4) Merit Student of Yunnan University && First-class Scholarship.
(5) 2015 First Prize in Contemporary Undergraduate Mathematical Context in Modeling.

OTHER EXPERIENCE

(1) Serving as volunteer in Mental Health Therapy Center in Kunming.
(2) Serving as volunteer for water supply for forester around University of Chinese academy of Sciences.

SKILLS

(1) Programming Language: Proficient in SIMD, C, ASM. Skilled at OpenCL/C++.
(2) Development Tools: Proficient in VIM, gcc, g++, cmake, makefile, git. Average at gtest.
(3) English Level: Toefl:102, GRE:328.