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Research Interests

High performance computing, Performance tuning, SIMD programming, GPGPU.

Education

- Institute of Computing technology   High Performance Computing   Master   2017.09-Now.
  Supervisor: Prof. Yunquan Zhang.
- Yun Nan University   Computer Science   Bachelor   2013.09-2017.07

Research Projects

1) RealFFT: A project that aims to implement the fastest real FFT library on both ARMv8 and X86(Haswell architecture).
1) A Thorough study on existing real FFT algorithms. Propose our real FFT algorithm framework for different real FFT kinds.
2) Parallelize real FFT specific operations, such as split, in SIMD (Neon and AVX) kernel.
3) Reduce memory access times by cache blocking when solve high dimensional real FFTs.
Finally, achieve speedup around 1.34x~1.52x compared with FFTW on ARMv8 for 1D transforms, and achieve 1.10x~1.41x speedup for 2D transforms. Achieve competitive performance compared with MKL on X86 architecture.

2) ARMIPP: A project that aims to implement and optimize a high performance IPP library on ARMv8 architecture corresponding to Intel IPP interfaces.
1) A Thorough survey on fast numerical algorithm of operations to be implemented.
2) Implement and optimize these operations such as (e^x, lnx, min, max, median filter) with intrinsics on ARMv8 architecture.
In the end, achieve comparable speedup on ARMv8 architecture than X86.

Internship

1) Startup PerfxLab(Beijing).
Project Background: A project that aims to implement and tune high performance Gaussian Filter on mobile end (AMD GPU) for a deep learning inference framework of startup called PerfxLab in Beijing.
1) Optimization on Computation: Utilize SIMD technology (vector data type and vector load/store) to solve multiple filter values in the same time.
2) Fully utilize registers and local data share to reduce memory accesses for global memory.
3) Handle performance issues (Channel conflict, bank conflict) caused by architecture-unfriendly memory access pattern. In the end, our performance outperforms counterpart of OpenCV on this architecture around 21~33%.

2)Amazon AWS AI Lab (ShangHai)

- **Project Background:** A project aims to add numpy-compatible operations to MXNet.

Add operators including GCD (Greatest common divisor)，SINC(sin(x)/x) and so on into MXNet. Each operator includes forward and backward computation, inference of type and shape of inputs and outputs. The final purpose is to assure behavior of these operators are compatible with counterpart of 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). 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. (CCF B; SCI, Impact Factor:1.815).

(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).

Award

- 2019 Merit Students Awards of University of Chinese Academy of Sciences.
- The CCF Outstanding Undergraduate Award (Awarded by CCF, 100 undergraduates every year in China), 2016
- 2015 Second Prize in Contemporary Undergraduate Mathematical Contest in Modeling.