



復旦大學
FUDAN UNIVERSITY

Applied Math
Ph.D. Seminar

AlphaSparse: Directly Designing SpMV Programs by Machine

Speaker: Zhen Du (Institute of Computing Technology, Chinese Academy of Sciences)

Time: 2023-09-14, 16:10 to 17:00

Location: Rm 1801, Guanghua East Tower

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Abstract: SpMV is a fundamental kernel in high-performance computing. It is a core workload in iterative solvers (one of the seven dwarfs of scientific computing and engineering), data analysis, and graph computing. Over the past 50 years, a lot of research has been conducted on this kernel, and a lot of sparse matrix formats and their corresponding SpMV algorithms have been proposed. However, it is not easy to design a high-performance SpMV program because of the diversity of sparse matrix features and the sensitivity of program design to sparse matrix features.

For this reason, we propose AlphaSparse. AlphaSparse aims to bypass the limitations of human observation and practice, directly giving the sparse matrix format and SpMV algorithm designed by machine, which is suitable for this matrix.

Driven by the new SpMV program design method, AlphaSparse achieves more than 200% improvement on NVIDIA GPUs, while the annual improvement of SpMV programs is less than 5%.