Evaluating of performance of sparse matrix vector multiplication

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Sparse matrix vector multiplication is one of the most important and widely used algorithms to solve many scientific and engineering projects. so, the performance of many algorithms is dependent on the performance of sparse matrix vector multiplication algorithm. Duo to the importance of this problems, so far, most efforts to improve the efficiency of sparse matrix vector multiplication algorithm on different architectures by introducing new sparse matrix storage formats and their corresponding processing methods have been proposed. The use of parallel processing to calculate the sparse matrix vector multiplication improve the performance because of its high parallel implementation of the algorithms. Also, sparse matrix vector multiplication is one of the algorithms that have a lot transaction with memory. So, using GPU is efficient to improve the performance of algorithm because of its high ability in parallel execution and its high bandwidth. The objective of this work is to implement the sparse matrix storage formats like ELLR-T, rgCSR, ELL, scalar CSR, vector CSR on GPU and compare the performance of this formats on high matrices. Also, for comparing GPU and CPU, CSR format with several dimensions on sparse matrix is implemented on GPU and CPU. The result show that sparse matrix vector multiplication execution time in ELLR-T format is better than other formats. Also, comparing sparse matrix vector multiplication execution time on GPU and CPU show that by extension of matrix dimensions, the performance of sparse matrix vector multiplication on GPU increase against CPU

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