Limited-Precision Stochastic Rounding: A Probabilistic Error Analysis

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摘要： Stochastic rounding has emerged as an effective technique to mitigate rounding errors in low-precision floating-point computations. This rounding mode has been investigated theoretically, but existing results have been derived under the assumption that the implementation is exact, which typically requires too large an amount of hardware resources to be feasible. To understand the behaviour of practical implementations, we introducelimited-precision stochastic rounding. Unlike the ideal stochastic rounding operator generally considered in the literature, this new variant accurately matches current hardware implementations, and therefore can be used to understand the numerical behaviour that is observed in practice. We discuss some preliminary analysis of limited-precision stochastic rounding, and we show some experimental results that corroborate the analysis.

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