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Faster Matrix Multiplication

In 1969, Volker Strassen came up with an algorithm for multiplying two 2×2 matrices using only 7 multiplications (instead of the usual 8). Using block matrices, this allows us to multiply two $n\times n$ matrices in $n^{2.81}$ multiplications. Subsequent improvements by Coppersmith and Winograd, Cohn and Umans, Stothers, and others have reduced this to $O(n^{2.38})$ multiplications, but these techniques only provide advantage for extremely large matrices.

We present some common operator-theoretic frameworks for all these results, and discuss some new results for small matrices.