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# Accurate Randomized Algorithms of Numerical Analysis

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Randomized algorithms are ubiquitous in computer science and computer engineering. Many problems that are intractable when viewed deterministically can be effectively solved with probabilistic techniques. Perhaps the most important aspect of most randomized procedures in current use is the fact that they produce the correct result with (practically speaking) 100% reliability, and have little effect on the accuracy of the calculation.

Historically, randomized techniques have been less popular in numerical analysis. Most of them trade accuracy for speed, and in many numerical environments one does not want to add yet another source of inaccuracy to the calculation that is already sufficiently inaccurate. One could say that in numerical analysis probabilistic methods are an approach of last resort.

I will discuss several probabilistic algorithms of numerical linear algebra that are never less accurate than their deterministic counterparts, and in fact tend to produce better accuracy. In many situations, the new schemes have lower CPU time requirements than existing methods, both asymptotically and in terms of actual timings.