

Matrix algorithms, volume I: basic decompositions

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Abstrak

This thorough, concise, and superbly written volume is the first in a self-contained five-volume series devoted to matrix algorithms. It focuses on the computation of matrix decompositions--that is, the factorization of matrices into products of similar ones.

The first two chapters provide the required background from mathematics and computer science needed to work effectively in matrix computations. The remaining chapters are devoted to the LU and QR decompositions--their computation and applications. The singular value decomposition is also treated, although algorithms for its computation will appear in the second volume of the series. The present volume contains 65 algorithms formally presented in pseudocode.

Other volumes in the series will treat eigensystems, iterative methods, sparse matrices, and structured problems. The series is aimed at the nonspecialist who needs more than black-box proficiency with matrix computations. To give the series focus, the emphasis is on algorithms, their derivation, and their analysis. The reader is assumed to have a knowledge of elementary analysis and linear algebra and a reasonable amount of programming experience, typically that of the beginning graduate engineer or the undergraduate in an honors program. Strictly speaking, the individual volumes are not textbooks, although they are intended to teach, the guiding principle being that if something is worth explaining, it is worth explaining fully. This has necessarily restricted the scope of the series, but the selection of topics should give the reader a sound basis for further study.