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LinBox Exact Linear Algebra Software Library

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Abstract

LinBox is a C++ template library of routines for solution of linear algebra problems including linear system solution, rank, determinant, minimal polynomial, and characteristic polynomial. In some cases, Frobenius normal form, Smith normal form, and other functions are available. Algorithms are provided for matrices with integer entries or entries in a finite field. In support of the algorithms, a good collection of finite field and ring implementations is available. Also there is provided a number of matrix storage types, especially for blackbox representation of sparse or structured matrix classes. A few algorithms for rational matrices are available. More for integer and rational matrices is planned for future releases.

The primary goal of LinBox is high performance. Its speed vastly exceeds general-purpose symbolic mathematics systems such as Mathematica and Maple in most instances. The second goal is genericity: Through carefully designed interfaces implemented using the C++ template mechanism, it is not necessary to write a separate function for each combination of algorithmic problem, field representation, and matrix representation (there are over 1000 such combinations). Linbox is available at linalg.org