Abstract

Interior point methods for linear programming need to solve the linear equations which have the property of symmetric and positive definiteness. The sparsity of cholesky factor $L$ dramatically affects the performance of solution algorithm, because interior point methods solve the linear equations by Cholesky factorization. So interior point methods need ordering and handling dense columns to maintain the sparsity of the Cholesky factor $L$.

In this thesis the existing studies on the minimum degree ordering method are analyzed and on the basis of those the new ordering method is suggested. The new ordering method improves the computational time of ordering. And we suggest the efficient implementation of Schur complement method, one of the dense columns handling methods.

Most of the computational time is spent in updating the degree in minimum degree ordering method. This thesis suggests approximate minimum degree ordering method which utilizes the upper bound and lower bound of a degree in clique storage. This method improves the computational time by reducing the time of degree update.

If the coefficient matrix $A$ has dense columns then the matrix $A^T A$ becomes a dense matrix. This reduces the performance of interior point methods. The Schur complement method is used to handle dense columns. Specially if the coefficient matrix $A$ has a few dense columns, the Schur complement method is very effective in computational time. We suggest efficient implementation of Schur complement method which improves the computational time by reducing the number of substitutions.

Key Words : Interior point methods, Minimum degree ordering
Dense columns, Schur complement method
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