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Solving Linear Systems Involved in Convex Programming Problems

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Abstract : Many interior point methods for convex programming solve an (n+m)x(n+m)linear system in each iteration. Many implementations solve this system in each iteration by considering an equivalent mXm system (4) as listed in the paper, and thus the job is reduced into solving the system (4). However, the system(4) has to be solved exactly since otherwise the error would be entirely passed onto the last m equations of the original system. Often the Cholesky factorization is computed to obtain the exact solution of (4). One Cholesky factorization is to be done in every iteration, resulting in higher computational costs. In this paper, two iterative methods for solving linear systems using vector division are combined together and embedded into interior point methods. Instead of computing one Cholesky factorization in each iteration, it requires only one Cholesky factorization in the entire procedure, thus significantly reduces the amount of computation needed for solving the problem. Based on that, a hybrid algorithm for solving convex programming problems is proposed.

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