Mathematics > Optimization and Control

Conditional Gradient Algorithms for Rank-One Matrix Approximations with a Sparsity Constraint

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The sparsity constrained rank-one matrix approximation problem is a difficult mathematical optimization problem which arises in a wide array of useful applications in engineering, machine learning and statistics, and the design of algorithms for this problem has attracted intensive research activities. We introduce an algorithmic framework, called ConGradU, that unifies a variety of seemingly different algorithms that have been derived from disparate approaches, and allows for deriving new schemes. Building on the old and well-known conditional gradient algorithm, ConGradU is a simplified version with unit step size and yields a generic algorithm which either is given by an analytic formula or requires a very low computational complexity. Mathematical properties are systematically developed and numerical experiments are given.

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