Orthogonality-free Approaches for Optimization Problems on Stiefel Manifold

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ABSTRACT

In this talk, I will discuss some orthogonality-free approaches for optimization problems on Stiefel manifold. Stiefel manifold consists of matrices with orthogonal columns. Optimization problems with orthogonality constraints appear in many important applications such as leading eigenvalues computation, discretized Kohn-Sham total energy minimization, and sparse principal component analysis. We present new algorithms for solving optimization problems on Stieful manifold. These algorithms are based on penalty functions, thus there are no needs to carry out orthogonalization calculations in each iteration. The major computation cost of orthogonality-free algorithms is in the form of matrix-matrix multiplication, which has the advantage of being parallelized easily. Problems with both smooth and nonsmooth objective functions are considered. Theoretical properties of our alrogithms are discussed and numerical experiments are also presented.

BIOGRAPHY

Ya-xiang Yuan is a professor at the Academy of Mathematics and Systems Science, Chinese Academy of Sciences. He graduated from Xiangtan University in 1982 and obtained his Ph.D. from University of Cambridge in 1986. He mainly works on numerical methods for nonlinear optimization, he has made outstanding contributions to trust region algorithms, quasi-Newton methods, nonlinear conjugate gradient methods and subspace methods. He was the president of Chinese Mathematical Society (2016-2019), the president of the OR Society of China (2004-2012). Currently he is the president of International Council for Industrial and Applied Mathematics. He is an academician of CAS, Fellow of SIAM, Fellow of AMS, Corresponding Member of Brazilian Academy of Science and Fellow of TWAS.

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Registration Links: https://polyu.zoom.us/meeting/register/tJYoce2uqDwrEtBNRsANU36G7Pp_w6Kkf5vs
Successful registrant will receive a confirmation email with a web link and password for the online lecture.
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