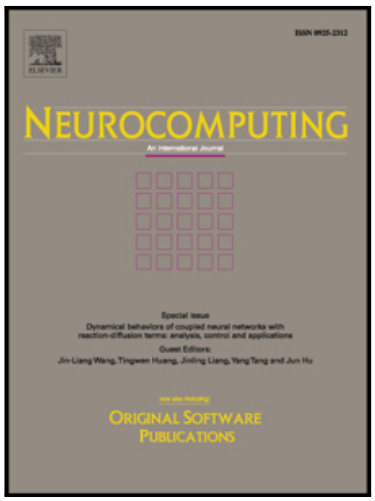

An Adaptive Line Search Scheme for Approximated Nuclear Norm Based Matrix Regression

Lei Luo , Qinghua Tu , Jian Yang , Jingyu Yang

PII: S0925-2312(18)30145-0
DOI: 10.1016/j.neucom.2018.02.016
Reference: NEUCOM 19306

To appear in: *Neurocomputing*

Received date: 2 January 2017
Revised date: 5 December 2017
Accepted date: 1 February 2018

Please cite this article as: Lei Luo , Qinghua Tu , Jian Yang , Jingyu Yang , An Adaptive Line Search Scheme for Approximated Nuclear Norm Based Matrix Regression, *Neurocomputing* (2018), doi: 10.1016/j.neucom.2018.02.016

An Adaptive Line Search Scheme for Approximated Nuclear Norm Based Matrix Regression

Lei Luo*zzdxpyy3001@163.com, Qinghua Tu, Jian Yang, Jingyu Yang

School of Computer Science and Engineering, Nanjing University of Science and Engineering, Nanjing 210094, P. R. China

*Corresponding author.

Abstract

Face recognition with partial occlusion is common in the real world and has become a hot topic in the pattern recognition research. Recently, nuclear norm based matrix regression model (NMR) has been shown a great potential in dealing with the structural noise. And yet, it uses Alternating Direction Method of Multipliers (ADMM) to achieve the optimal regression coefficients, which needs to bring into an auxiliary variable and only exploits the convexity of NMR. Comparing with ADMM, the gradient based methods are simpler. To take advantage of these methods, this paper considers the Approximated NMR model with Elastic-net regularization (ANMRE). By virtue of the soft-thresholding (shrinkage) operator, singular value shrinkage operator and strong convexity of ANMRE, the dual problem of ANMRE (DANMRE) is derived and a crucial result is obtained: the primal optimal solution of ANMRE can be converted as the matrix function associated with the dual optimal solution. Leveraging the differentiability of DANMRE, an adaptive line search scheme is developed to solve it. This approach makes full use of the advantages of the accelerated gradient technique and adaptive parameters updating strategy. Meanwhile, a convergence rate of $O(1/N^2)$ can be guaranteed under mild conditions. Experimental results on five standard databases show the superiority of the proposed algorithm over some existing methods.

Keywords

Adaptive line search scheme; Gradient method; Lipschitz continuous; Nuclear norm; Matrix regression; Face recognition