Cornell University Library

We gratefully acknowledge support from the Simons Foundation and member institutions

arXiv.org > cs > arXiv:1303.4434

Search or Article-id (Help | Advanced search) All papers Go!

Computer Science > Learning

A General Iterative Shrinkage and Thresholding Algorithm for Non-convex Regularized Optimization Problems

Pinghua Gong, Changshui Zhang, Zhaosong Lu, Jianhua Huang, Jieping Ye

(Submitted on 18 Mar 2013)

Non-convex sparsity-inducing penalties have recently received considerable attentions in sparse learning. Recent theoretical investigations have demonstrated their superiority over the convex counterparts in several sparse learning settings. However, solving the non-convex optimization problems associated with non-convex penalties remains a big challenge. A commonly used approach is the Multi-Stage (MS) convex relaxation (or DC programming), which relaxes the original non-convex problem to a sequence of convex problems. This approach is usually not very practical for large-scale problems because its computational cost is a multiple of solving a single convex problem. In this paper, we propose a General Iterative Shrinkage and Thresholding (GIST) algorithm to solve the nonconvex optimization problem for a large class of non-convex penalties. The GIST algorithm iteratively solves a proximal operator problem, which in turn has a closed-form solution for many commonly used penalties. At each outer iteration of the algorithm, we use a line search initialized by the Barzilai-Borwein (BB) rule that allows finding an appropriate step size quickly. The paper also presents a detailed convergence analysis of the GIST algorithm. The efficiency of the proposed algorithm is demonstrated by extensive experiments on large-scale data sets.

Subjects: **Learning (cs.LG)**; Numerical Analysis (cs.NA); Computation (stat.CO); Machine Learning (stat.ML)

Cite as: **arXiv:1303.4434 [cs.LG]**

(or **arXiv:1303.4434v1 [cs.LG]** for this version)

Submission history

From: Pinghua Gong [view email]

[v1] Mon, 18 Mar 2013 21:41:53 GMT (98kb)

Which authors of this paper are endorsers?

Download:

- PDF
- PostScript
- Other formats

Current browse context:
cs.LG
< prev | next >
new | recent | 1303

Change to browse by:
cs
cs.NA
stat
stat.CO
stat.ML

References & Citations
- NASA ADS

DBLP - CS Bibliography
listing | bibtex
Pinghua Gong
Changshui Zhang
Zhaosong Lu
Jianhua Huang
Jieping Ye

Bookmark(what is this?)

Link back to: arXiv, form interface, contact.