Department of Statistics

MASTER'S THESIS PRESENTATION

JIHANG ZHANG

Department of Statistics
The University of Chicago

Empirical Examination on Nonconvex Penalties

WEDNESDAY, May 9, 2018, at 2:30 PM
Jones 226, 5747 S. Ellis Avenue

ABSTRACT

This thesis addresses the problem of the nonconvex optimization. Specifically, this work focuses on nonconvex penalties/constraints on linear regression. Some statistical models require sparse selection to enhance the prediction accuracy and interpretability. LASSO is one of the commonly used technique to fulfill such requirement, but it produces highly biased estimators in some settings. In order to limit the bias, a number of nonconvex penalties have been proposed, such as the smooth clipped absolute deviation (SCAD) and the minimax concave penalty (MCP). These kinds of nonconvex optimization problems can be either formalized in penalty form or constraint form. We compare these penalties along with other notable nonconvex penalties such as l_q penalty and log-l_1 penalty through some empirical simulations. The comparison mainly focuses on the accuracy of models and the stability of optimization. These penalized least squares problems are solved by coordinate descent algorithm originally proposed by Friedman, Hastie and Tibshirani (2009). Our work also extents the application of the algorithm to some other nonconvex penalties.

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