Dear Professor Liu and Professor Zhao,

I am submitting my article "Insights and algorithms for the multivariate square-root lasso" to be considered for publication in the Journal of the American Statistical Association, Theory and Methods.

In this article, I examine the *multivariate square-root lasso* as a method for fitting the multivariate response linear regression model whose errors have a general covariance structure. There exist many methods for fitting the multivariate response linear regression model which incorporate an explicit estimate of the error precision matrix into the estimation criterion. However, these methods are often computationally intensive and require solving non-convex optimization problems. The multivariate square-root lasso, a convex generalization of the univariate square-root lasso, is a computationally efficient alternative to the existing methods.

I study this estimator from a theoretical, computational, and empirical perspective. I propose the two efficient proximal algorithms, one of which has a general convergence guarantee, the other of which can be extremely fast in special settings. In addition, I establish error bounds for this estimator and in so doing, prove that, like the univariate square-root lasso, the multivariate square root lasso is pivotal with respect to the unknown error covariance matrix. Through extensive simulations and a real data example, I show that this estimator outperforms a number of competitors, even those which have oracle knowledge of the unknown error covariance matrix. In addition, I use my theoretical results to establish a tuning procedure which does not require cross-validation: it requires fitting the model only once and in simulation studies, often performed best amongst a large number of competing methods.

An R package implementing this method is available upon request and will be maintained on my GitHub page upon publication.

I sincerely thank you for your time and consideration. Please feel free to contact me by email with any questions or concerns.

Sincerely,

Aaron J. Molstad, PhD
Biostatistics Program
Fred Hutchinson Cancer Research Center
Seattle, WA, 98109
mail: amolstad@fredhutch.org
web: ajmolstad.github.io