A Comparison of Estimation Methods for Natural Log-Based Generalized Linear Models

A Manuscript Proposal

MdShafiul Alam, Jonathan Boardman, Seema Sangari, Lauren Staples and Dr. Herman Ray

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Many estimation algorithms exist for Generalized Linear Models (GLM). Some algorithms include the use of the Hessian matrix (the second derivative) of the loss function, whereas others only make use of the gradient (first derivative). Our goal is compare several of these algorithms, while restricting the large GLM class to only the natural log based link functions thus restricting our comparisons to convex loss functions. We plan to investigate the following points:

1. A brief discussion on the convexivity of natural log-based class of GLM (poission, binomial, and Exponential).
2. A brief introduction of the mathematics of the loss function of at least two first order derivative estimation functions and two second order estimation functions.
3. A comparison of performance of the estimation methods on simulated datasets with varying N and p. The algorithms will be compared based on time to convergence, computation time, and accuracy of estimating the simulated population parameter.