HOMEWORK 3

(1) Write Newton-Raphson algorithm to estimate logistic regression.

Reminder: you need to derive the equation

$$\frac{\partial^2 \ell(\beta)}{\partial \beta \partial \beta^\top} = -\sum_i x_i x_i^\top p(x_i;\beta)\big\{1 - p(x_i;\beta)\big\}. \tag{0.1}$$

Generate $X = (1, X_1, X_2)$, where $X_j \sim N(0, I_N)$.

Set true parameter $\beta = (0.5, 1.2, -1)^\top$.

Set $N = 200, 500, 800, 1000$.

Estimate β using NR algorithm for $R = 200$ rounds of simulation. For each round of simulation, terminate the iteration when $\max_j |\widehat{\beta}_j^{old} - \widehat{\beta}_j^{new}| < 10^{-5}$. Denote $\widehat{\beta}_j^{(r)}$ as the estimation of β_j in the rth round of simulation. Then please: for each j, draw $(\widehat{\beta}_j^{(r)} - \beta_j)$ in boxplot for $N = 200, 500, 800, 1000$.

最后以 HTML 的形式提交结果。

提交时间：10 月 9 日，晚 20:00 之前。请预留一定的时间，迟交作业扣 3 分，作业抄袭 0 分。