

(4b)

Newton-Raphsen update scheme:

$$B_{n+1} = B_n - [H^{-1} \cdot \nabla L(B_n)]$$

$$L(B) = \sum_{i=1}^n [y_i \log p_i + (1-y_i) \log(1-p_i)]$$

$$\text{Gradient} = \sum_{i=1}^n (y_i - p_i) X_{ij}$$

Weighted least square

$$L(B) = \sum_{i=1}^n w_i (y_i - p_i)^2$$

$$\text{Gradient} = \sum_{i=1}^n -2 \sum_{j=1}^n (y_i - p_i) \times (w_i \times p_i \times (1-p_i)) \times X_{ij}$$

So if $w_i = \frac{1}{p_i(1-p_i)}$, the Gradient in the both is

Same.

∴ By using the Newton-Raphsen update also, we can solve for the weighted Least Square.

→ But, with each iteration, the weight also should be updated as with iteration we again get $P_i(1-P_i)$ product.

① * As we do the iteration and repeatedly change the weights to achieve the Newton-Raphson, we call it Iterative Reweighted Least squares method.