Patrick GWAS notes

Linear Fixed Effects Model

Test each marker independently with the following model:

$$y = \beta_0 + \beta x$$

Find the probability p that $\beta \neq 0$

To do this we fit each model using

$$\begin{bmatrix} \beta_0 \\ \beta \end{bmatrix} = (X^T X)^{-1} X^T y$$

For each β we find the t-statisitc computed as:

$$t = \frac{\beta}{se_b}$$

where β is as computed above, and se_β is the standard error of beta computed as:

$$se_\beta = \frac{\sqrt{\frac{\sum_i (y_i - \hat{y}_i)^2}{n-2}}}{\sum_j (x_j - \bar{x})}$$

The p can then be computed as:

$$p = 2 \cdot (1 - F(t))$$

where F is the t-distribution CDF with $n - 2$ degrees of freedom. p values and then $-\log$ transformed to produce a manhattan plot.

Mixed Effects Model