

$$\sum_{i=1}^{p} X_{ij} \beta_j = y_i, \ (i = 1, 2, ..., n),$$
 with $n > p$

$$\mathbf{X} = egin{bmatrix} X_{11} & X_{12} & \cdots & X_{1p} \ X_{21} & X_{22} & \cdots & X_{2p} \ dots & dots & \ddots & dots \ X_{n1} & X_{n2} & \cdots & X_{np} \end{bmatrix}, \qquad oldsymbol{eta} = egin{bmatrix} eta_1 \ eta_2 \ dots \ eta_p \end{bmatrix}, \qquad \mathbf{y} = egin{bmatrix} y_1 \ y_2 \ dots \ y_n \end{bmatrix}.$$

$$X\beta = y$$
,

$$\hat{oldsymbol{eta}} = rg \min_{oldsymbol{eta}} S(oldsymbol{eta}), \quad S(oldsymbol{eta}) = \sum_{i=1}^n \left| y_i - \sum_{j=1}^p X_{ij} eta_j
ight|^2 = \left\| \mathbf{y} - \mathbf{X} oldsymbol{eta}
ight\|^2.$$
 $\hat{oldsymbol{eta}} = \left(\mathbf{X}^\mathsf{T} \mathbf{X} \right)^{-1} \mathbf{X}^\mathsf{T} \mathbf{y}.$

coefficient of determination:

$$SS_{ ext{res}} = 1 - rac{SS_{ ext{res}}}{SS_{ ext{tot}}} \hspace{0.5cm} SS_{ ext{res}} = \sum_i (y_i - f_i)^2 = \sum_i e_i^2 SS_{ ext{tot}} = \sum_i (y_i - ar{y})^2$$

https://en.wikipedia.org/wiki/Regression_analysis https://en.wikipedia.org/wiki/Ordinary_least_squares