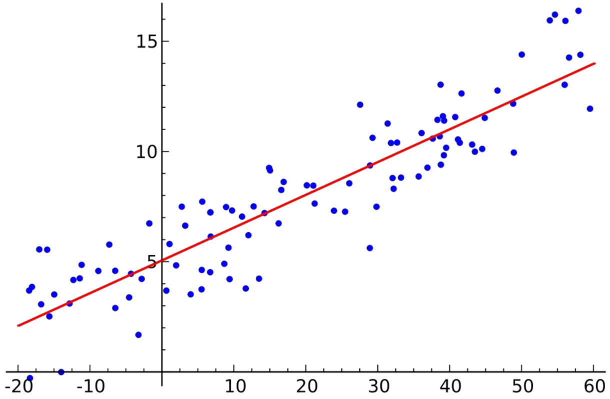
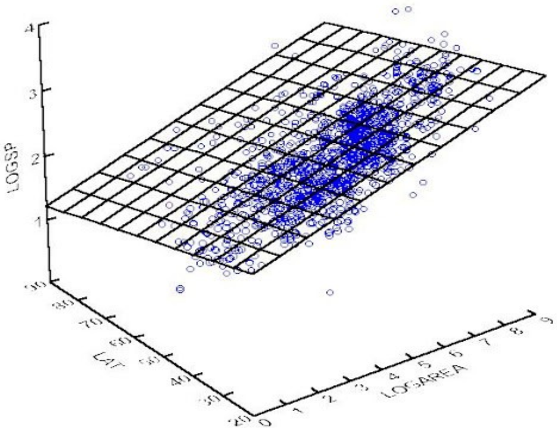


$$\sum_{j=1}^{p} X_{ij}\beta_j = y_i,\ (i = 1, 2, \dots, n),$$

with n > p

$$\mathrm{X} = \begin{bmatrix} X_{11} & X_{12} & \cdots & X_{1p} \\ X_{21} & X_{22} & \cdots & X_{2p} \\ \vdots & \vdots & \ddots & \vdots \\ X_{n1} & X_{n2} & \cdots & X_{np} \end{bmatrix}, \qquad \boldsymbol\beta = \begin{bmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_p \end{bmatrix}, \qquad \mathbf{y} = \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{bmatrix}.$$

$$\mathrm{X}\boldsymbol\beta = \mathbf{y},$$



$$\hat{\boldsymbol\beta} = \underset{\boldsymbol\beta}{\arg\min}\, S(\boldsymbol\beta), \qquad S(\boldsymbol\beta) = \sum_{i=1}^{n} \left| y_i - \sum_{j=1}^{p} X_{ij}\beta_j \right|^2 = \left\| \mathbf{y} - \mathrm{X}\boldsymbol\beta \right\|^2.$$

$$\hat{\boldsymbol\beta} = \left(\mathrm{X}^{\mathsf T}\mathrm{X}\right)^{-1}\mathrm{X}^{\mathsf T}\mathbf{y}.$$

coefficient of determination:

$$R^2 = 1 - \frac{SS_{\rm res}}{SS_{\rm tot}} \qquad SS_{\rm res} = \sum_i (y_i - f_i)^2 = \sum_i e_i^2$$

$$SS_{\rm tot} = \sum_i (y_i - \bar{y})^2$$

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

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