Data Analysis

Neural Networks

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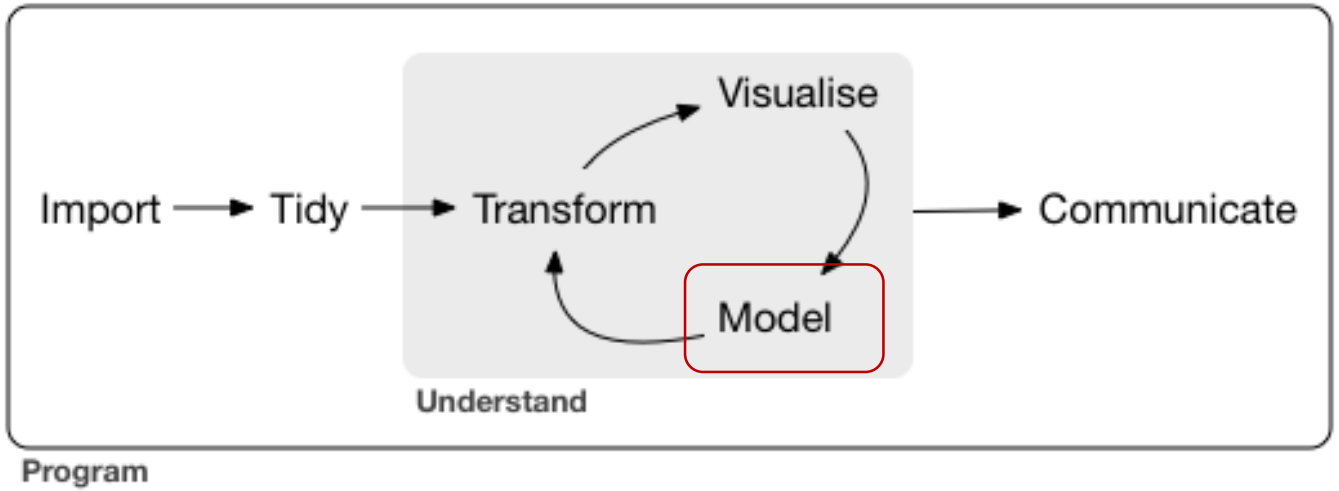
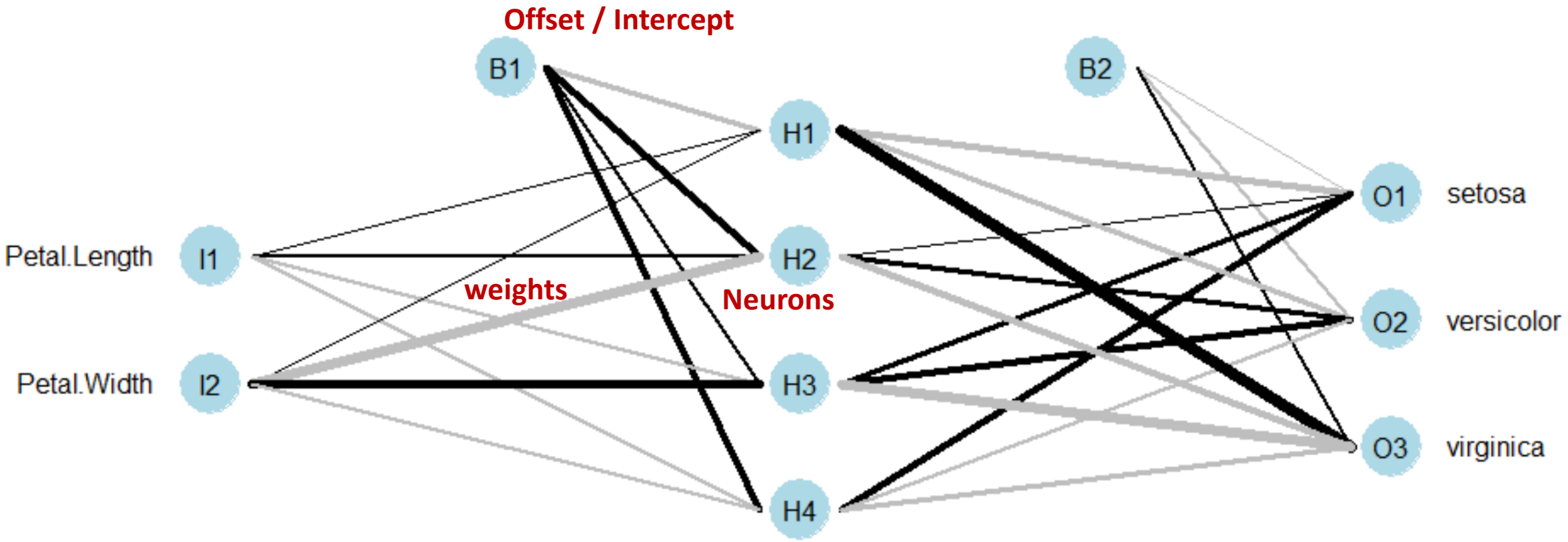
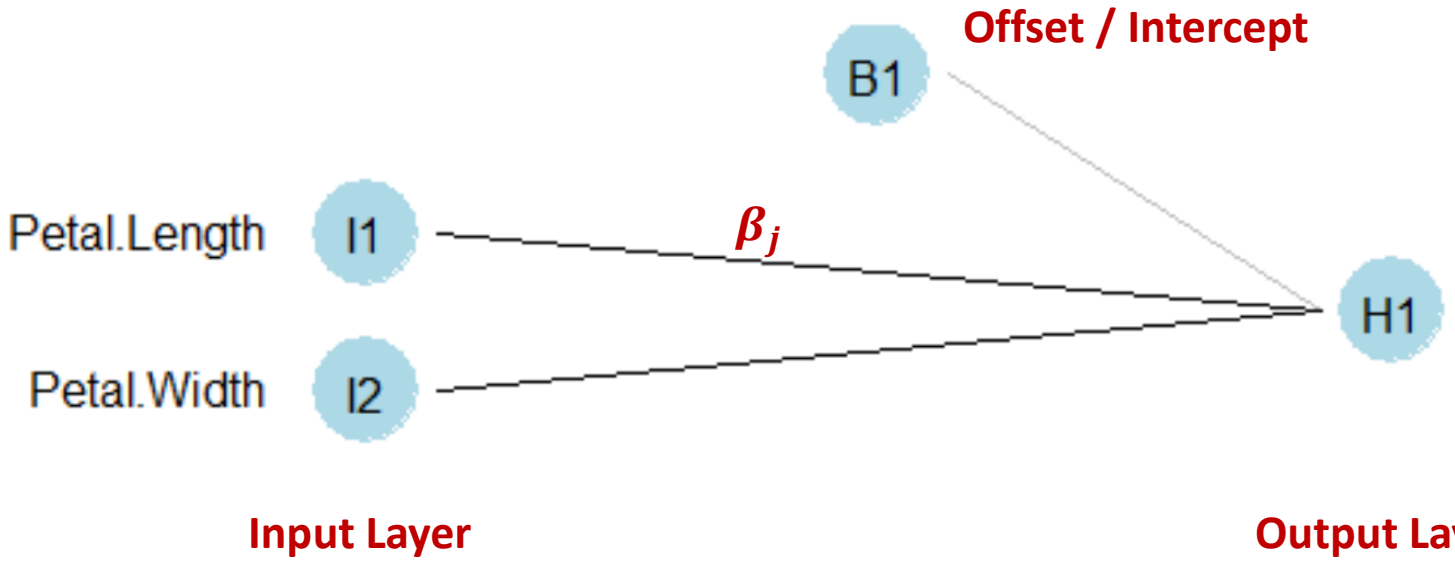
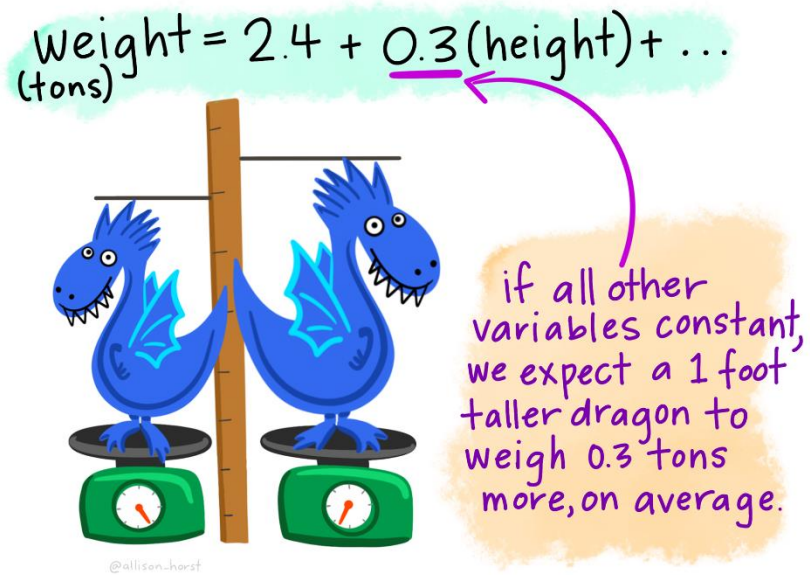

Import
Tidy
Transform
Visualise
Model
Understand
Communicate
Program


Offset / Intercept
B1
B2
H1
H2
H3
H4
Petal.Length
I1
Petal.Width
I2
weights
Neurons
O1
setosa
O2
versicolor
O3
virginica
Input Layer
Hidden Layer
Output Layer



$$y = \beta_0 + \beta_1 \cdot x_1 + \beta_2 \cdot x_2 + residual$$

$intercept$

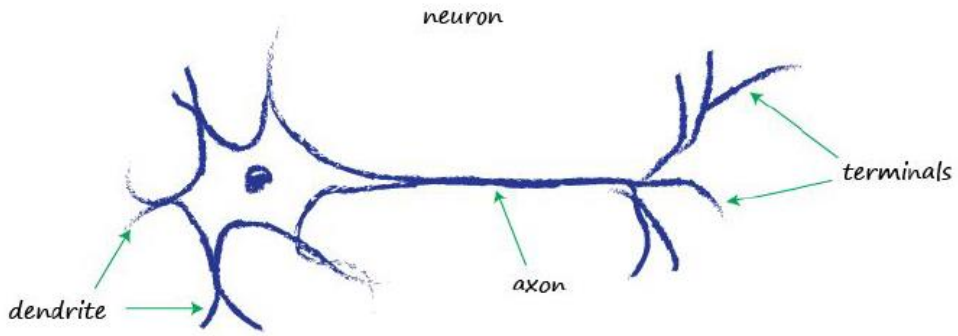


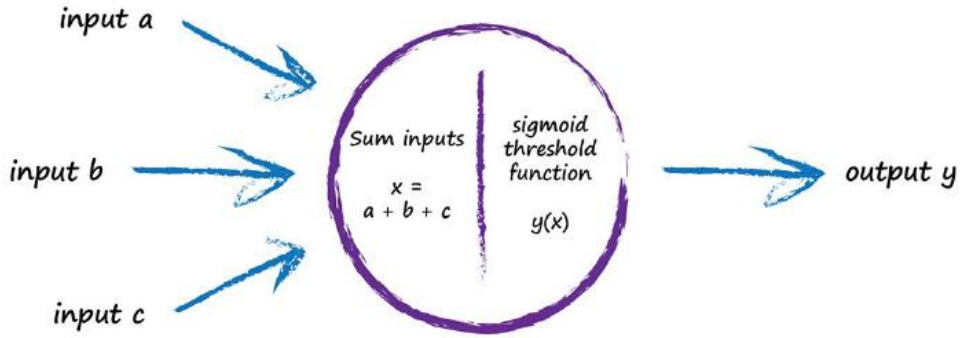
data

effects

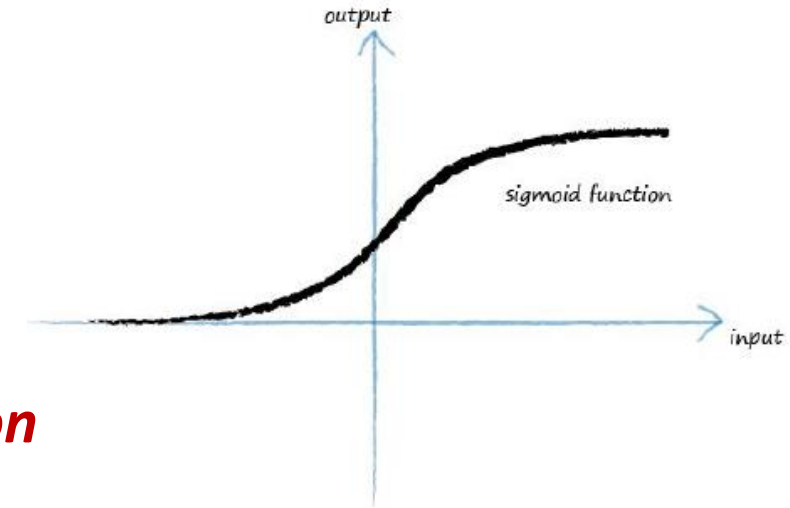
$$y = \beta_0 + \beta_1 \cdot x_1 + \beta_2 \cdot x_2 + residual$$

https://allisonhorst.com/linear-regression-dragons



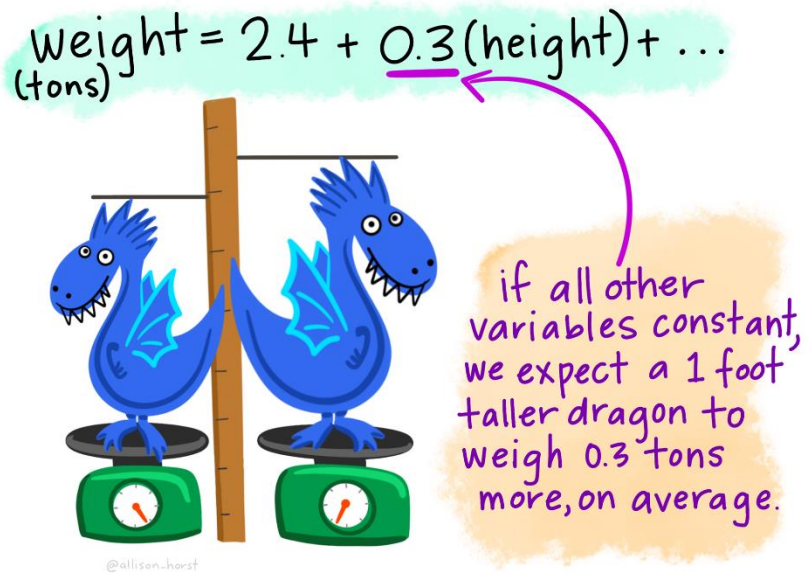


$$y = \frac{1}{1 + e^{-x}}$$



activation function

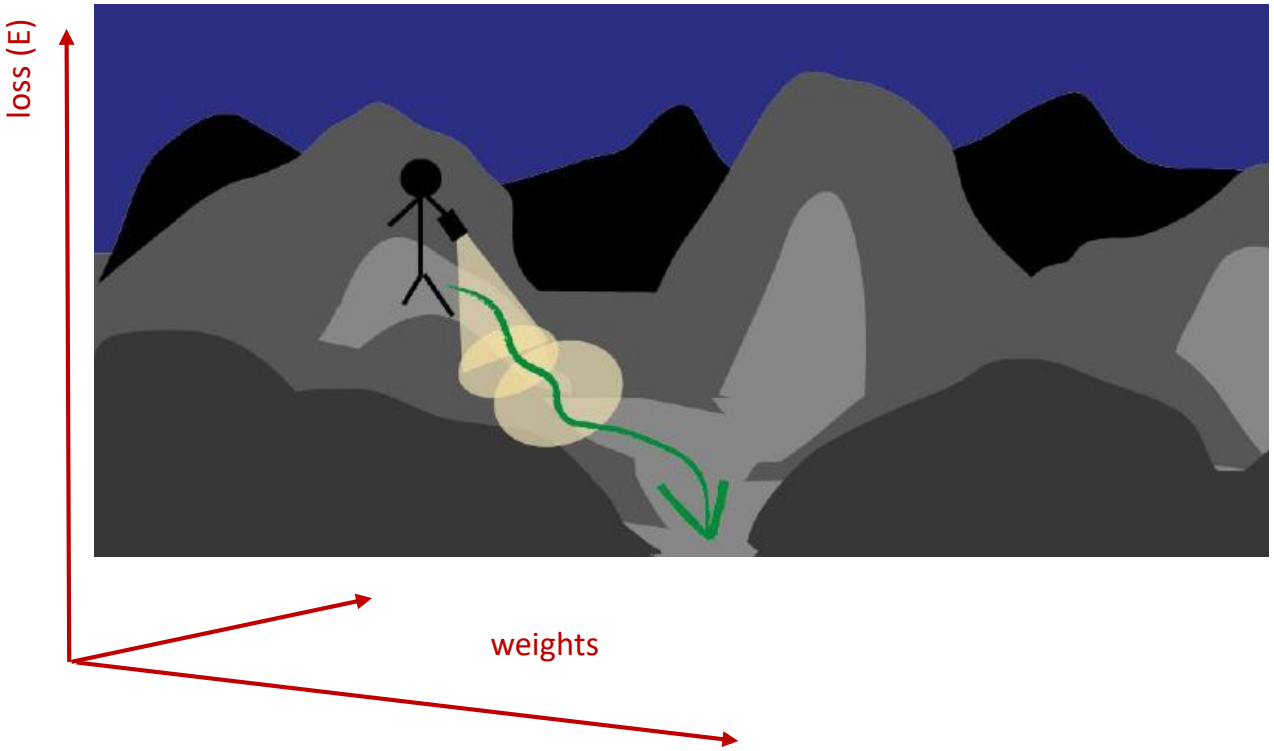
data

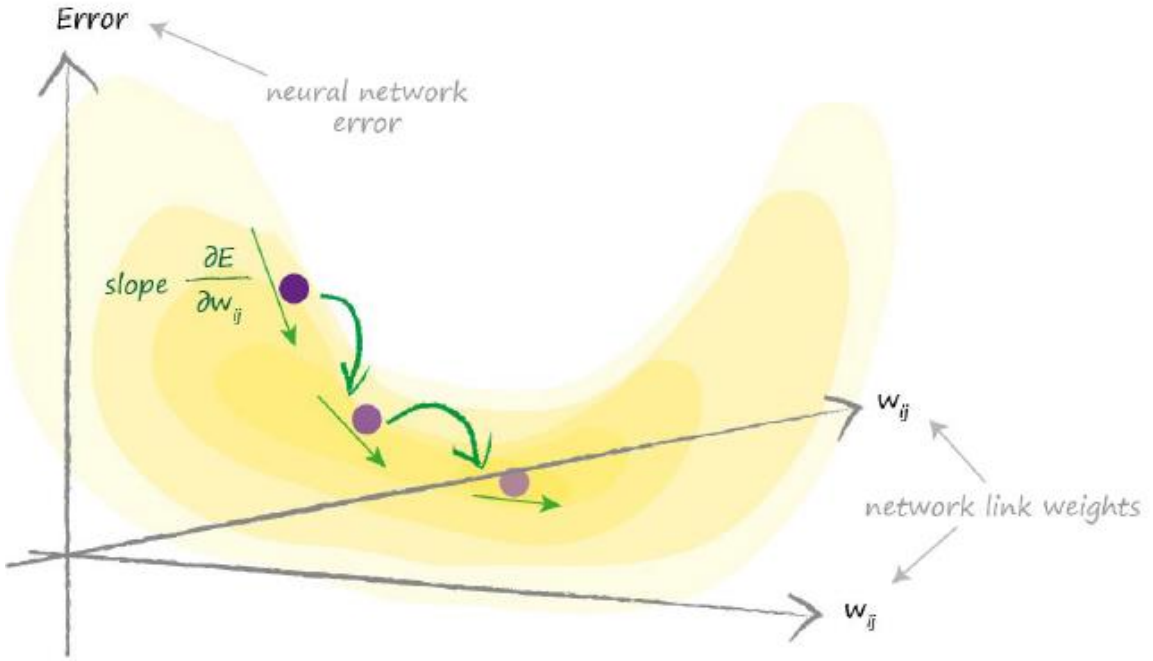


effects

residuals

$$y = \beta_0 + \beta_1 \cdot x_1 + \beta_2 \cdot x_2 + residual$$





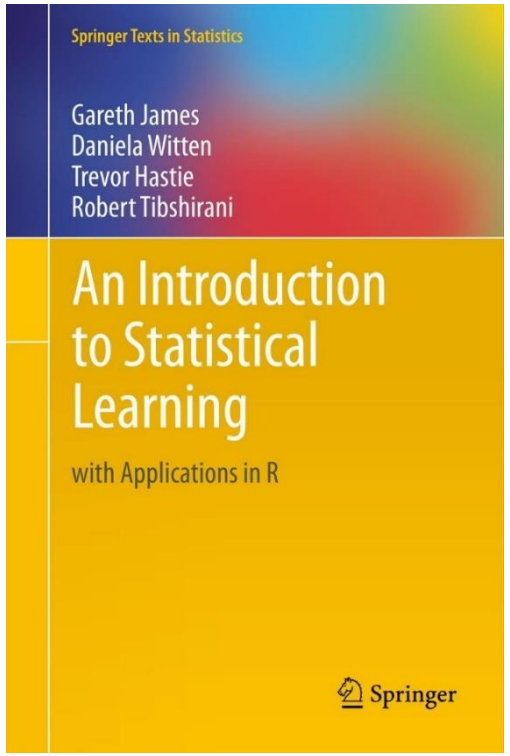
$$loss = \sum_{n=1}^{N} (residual)^2$$

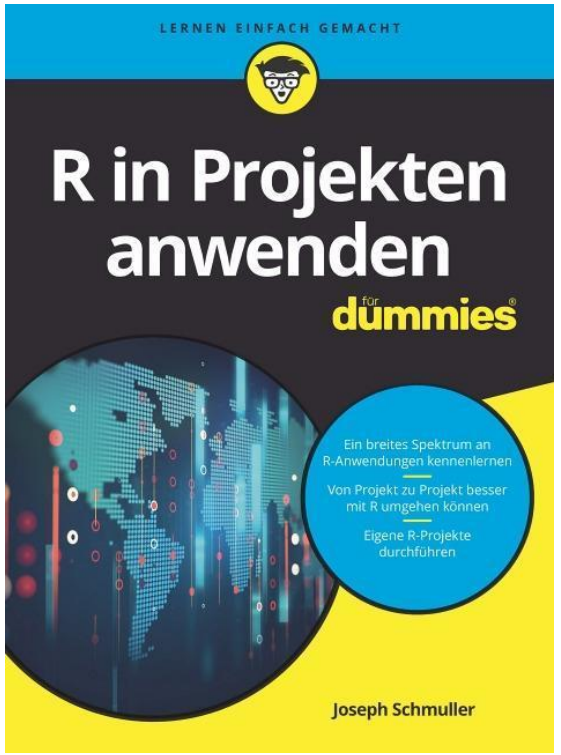
$$\begin{pmatrix} \Delta w_{1,1} & \Delta w_{2,1} & \Delta w_{3,1} & \dots \\ \Delta w_{1,2} & \Delta w_{2,2} & \Delta w_{3,2} & \dots \\ \Delta w_{1,3} & \Delta w_{2,3} & \Delta w_{j,k} & \dots \\ \dots & \dots & \dots & \dots \end{pmatrix} = \begin{pmatrix} E_1 * S_1 (1-S_1) \\ E_2 * S_2 (1-S_2) \\ E_k * S_k (1-S_k) \\ \dots \end{pmatrix} \cdot \begin{pmatrix} O_1 & O_2 & O_j & \dots \end{pmatrix}$$

values from next layer

values from previous layer

$$\Delta w_{jk} = \alpha \cdot E_k \cdot O_k (1 - O_k) \cdot O_j^T$$





https://www.statlearning.com/

Kap. 10: Deep Learning