Lineare Regression, Fehlerquadratsumme

Modell $y_i = a + b \cdot t_i + \varepsilon_i \qquad i = 1, 2, \dots, n$

$$S(a,b) = \sum_{(i)} (y_i - a t_i - b)^2 \rightarrow \min$$

$$\frac{\partial S}{\partial a} = \frac{\partial S}{\partial b} = 0 \quad \sim \quad \tilde{a}, \tilde{b}$$

$$\tilde{a} = \frac{(\Sigma t_i^2)(\Sigma y_i) - (\Sigma t_i)(\Sigma t_i y_i)}{n \Sigma t_i^2 - (\Sigma t_i)^2}$$

$$\tilde{b} = \frac{n \Sigma t_i y_i - (\Sigma t_i)(\Sigma y_i)}{n \Sigma t_i^2 - (\Sigma t_i)^2}$$

Damit: empirische Regressionslinie

Transformation $t' = t - \bar{t}$

$y' = y - \bar{y}$

mit $\bar{t} = \frac{1}{n} \Sigma t_i \; ; \; \bar{y} = \frac{1}{n} \Sigma y_i$

$$\tilde{b} = (\Sigma t_i' y_i') / (\Sigma t_i'^2)$$

$$\tilde{a} = \bar{y} - \bar{t}\tilde{b}$$