Korrelation

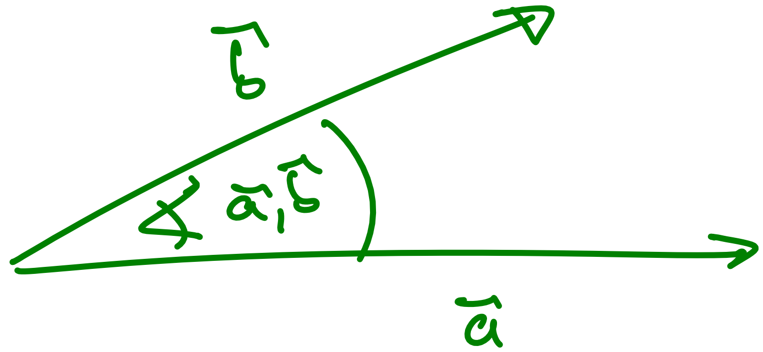
$$s_x = \sqrt{\frac{1}{n-1} \sum_{i=1}^{n} (x_i - \bar{x})^2}$$

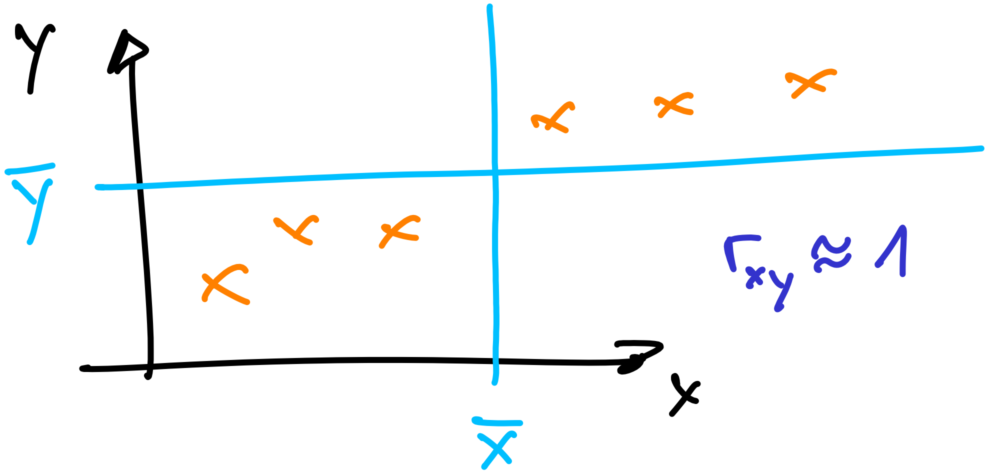
$$r_{xy} = \frac{s_{xy}}{s_x \cdot s_y} = \frac{\cancel{\frac{1}{n-1}} \sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\cancel{\frac{1}{n-1}} \sum_{j=1}^{n} (x_j - \bar{x})^2} \cdot \sqrt{\cancel{\frac{1}{n-1}} \sum_{k=1}^{n} (y_k - \bar{y})^2}}$$

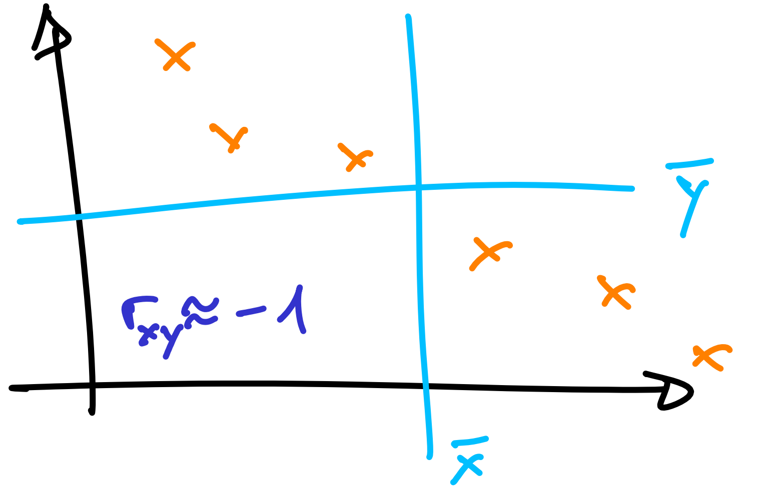
$$\vec{a} = \begin{pmatrix} x_1 - \bar{x} \\ \vdots \\ x_n - \bar{x} \end{pmatrix}, \quad \vec{b} = \begin{pmatrix} y_1 - \bar{y} \\ \vdots \\ y_n - \bar{y} \end{pmatrix}$$

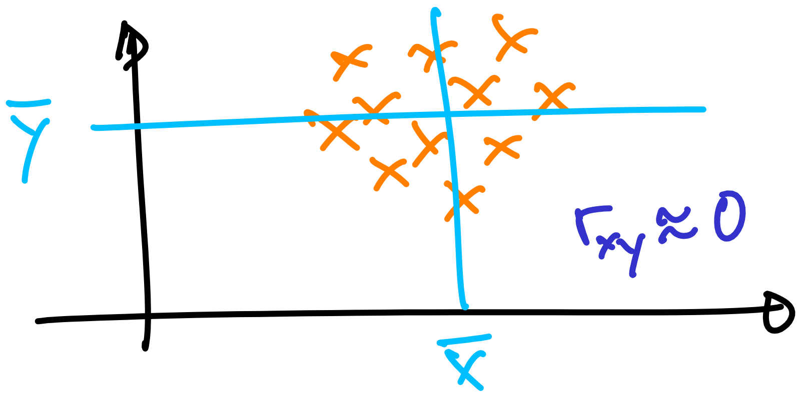
$$r_{xy} = \frac{\vec{a} \cdot \vec{b}}{|\vec{a}| \cdot |\vec{b}|} = \frac{\sum_{i=1}^{n} a_i b_i}{|\vec{a}|\,|\vec{b}|} = \frac{\sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y})}{\ldots}$$

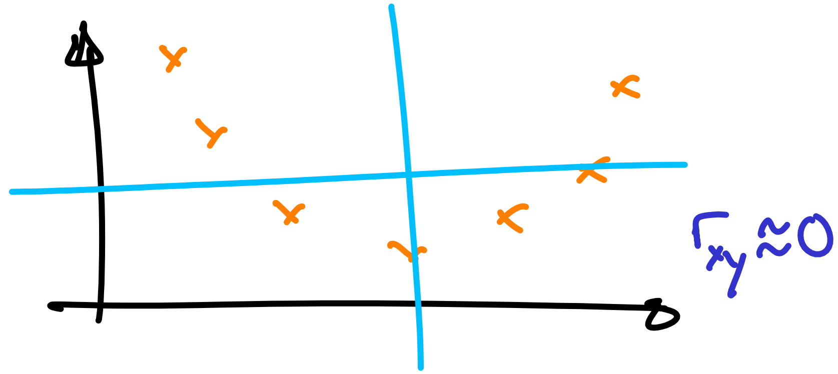
$$\vec{a} \cdot \vec{b} = |\vec{a}| \cdot |\vec{b}| \cdot \cos(\sphericalangle \, \vec{a}, \vec{b})$$

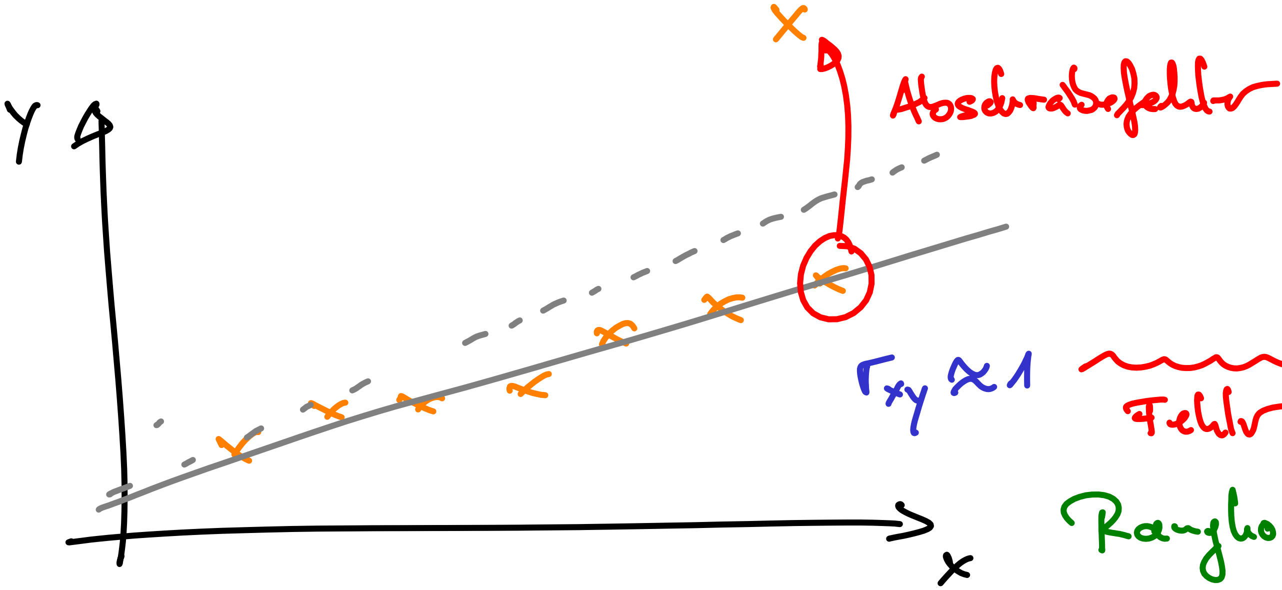








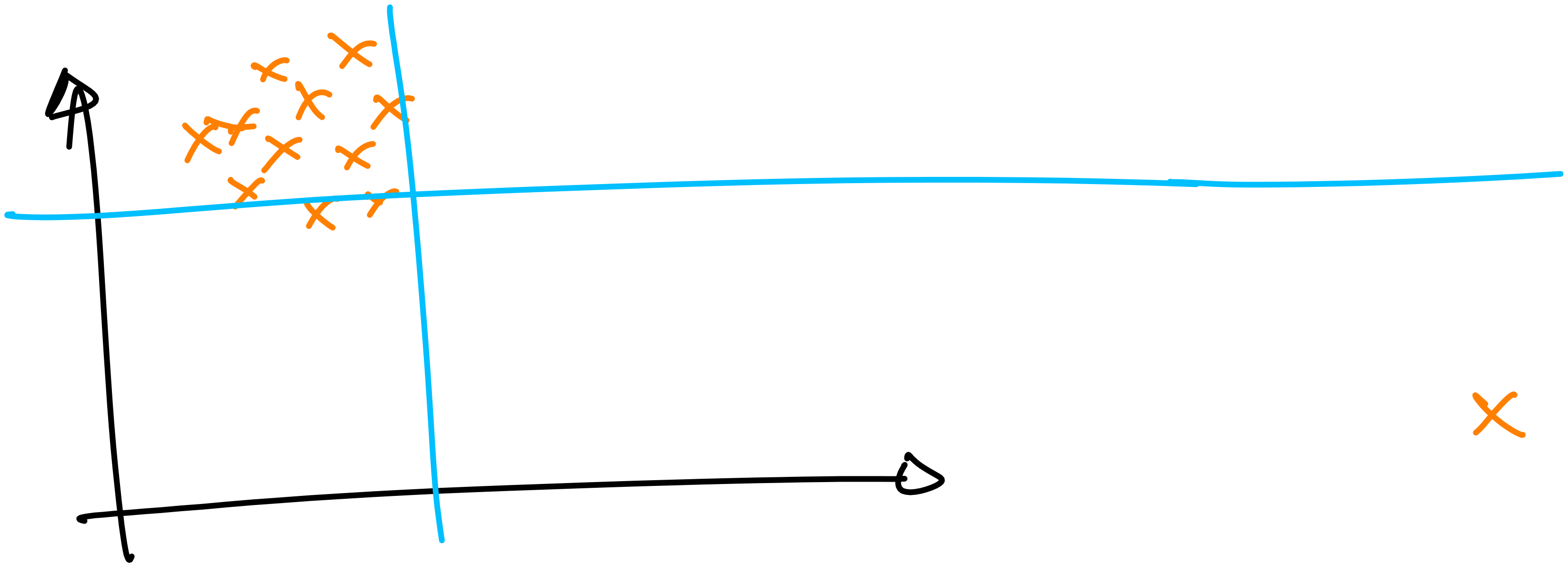




$r_{xy} \approx 1$ ⇝ Fehler

Korrelation sinkt

Rangkorrelation $r_{xy}^{(SP)}$ ändert sich nicht



$r_{xy} < 0$ „deutlich von Null verschieden“

etwas ganz anderes

faire Münze


Wahrscheinlichkeit $\frac{1}{2}$ $\frac{1}{2}$

3x werfen : Wahrsch. für 3x Kopf : $\left(\frac{1}{2}\right)^3 = \frac{1}{8} = 12{,}5\%$

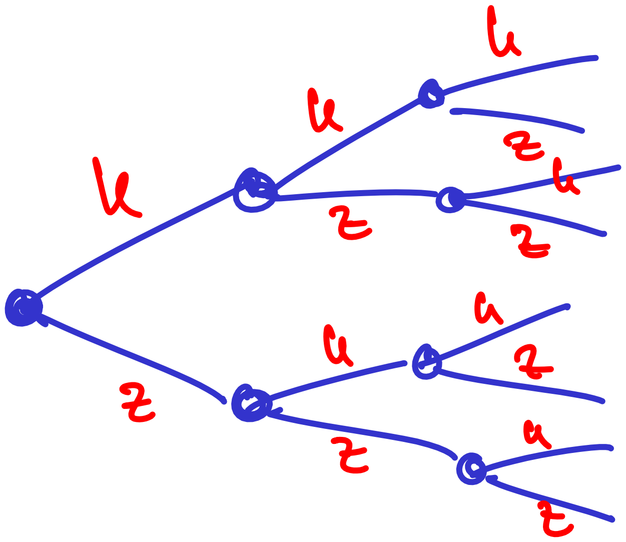
10x werfen : Wahrsch. für 9xK, 1xZ :

$$\left(\frac{1}{2}\right)^9 + \frac{1}{2}$$

$$\frac{1}{1024} = \left(\frac{1}{2}\right)^{10} \leftarrow 10 \times K$$

$$10 \cdot 9 \cdot 8 \cdots 1 = 10! > 1$$

zurück zu 3× Wurf



#K
3
2
2
1
2
1
1
0

Wahrsch. für $2 \times K$, $1 \times Z$: $\frac{3}{8}$

zurück zu 10× Wurf : $9 \times K$, $1 \times Z$

$$\left(\frac{1}{2}\right)^{10} \cdot 10 \approx 1\%$$