

$$X = [1, 2, \dots]$$

$$Y = [\text{rot}, \text{grün}, \text{rot}, \text{blau}]$$

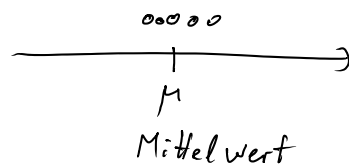
	rot	grün	blau	Σ
absolute Häufigkeit	2	1	1	4
relative Häufigkeit	50%	25%	25%	100%

Kennzahlen

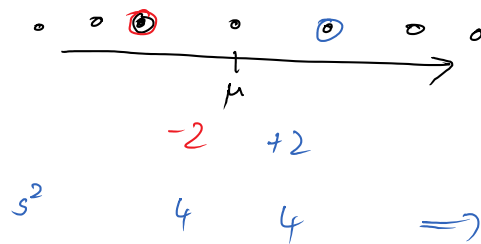
- | z | N.z | |
|-----|-----|--|
| ✓ | - | Median |
| ✓ | ✓ | Anzahl |
| ✓ | - | Durchschnitt = Mittelwert = Erwartungswert |
| ✓ | - | Boxplot → Visualisierung |
| ✓ | - | Min., Max |
| ✓ | - | oberes, unteres Quartil |
| (✓) | ✓ | häufigstes Element |
| ✓ | - | Standardabweichung (Streuung) |
| (✓) | ✓ | rel. Häufigkeit |
| (✓) | ✓ | absolute Häufigkeit |

Standard
abweichung
Streuung

klein



groß



s^2

-2 +2
4 4

$$\Rightarrow \frac{1}{2} \Sigma (4+4) = 8$$

Bsp zu Stichproben Kennzahlen

Stichprobe $X = (1, 3, 4, 1, 7, 2)$

Mittelwert $\bar{x} = \mu = \frac{1+3+4+1+7+2}{6} = \underline{\underline{3}}$

Sortiert $X' = (1, 1, 2, 3, 4, 7)$ $n=6$, gerade
 $\uparrow$

Median $m = \frac{x'_{n/2} + x'_{n/2+1}}{2} = \frac{2+3}{2} = 2.5$

Bsp zu Quantil

Stichprobe $X = (1, 2, 3, \dots, 10, 11, \dots, 100) = X'$
 $\uparrow \quad \uparrow$
 $q_{0.025} \quad q_{0.1}$

a) $p=0.1$: 10%-Quantil: $np = 100 \cdot 0.1 = 10$ ist ganzzahlig

$\Rightarrow q_p = q_{0.1} = \frac{x_{10} + x_{11}}{2} = \underline{\underline{10.5}}$ 10% Quantil

b) $p=2.5\%$: 2.5%-Quantil: $np = 100 \cdot 0.025 = 2.5$ nicht-ganzzahlig

$\Rightarrow q_p = q_{0.025} = x_{\lceil 2.5 \rceil} = x_3 = 3$

Bsp Boxplot

Stichprobe $x' = (-4, -3, 2, 3, 3, 4, 5, 5, 6, 7, 7, 8)$ $n=12$

$\uparrow$ $q_{0.25} = 2.5$ $\uparrow$ $m = 4.5$ $\uparrow$ $q_{0.75} = 6.5$

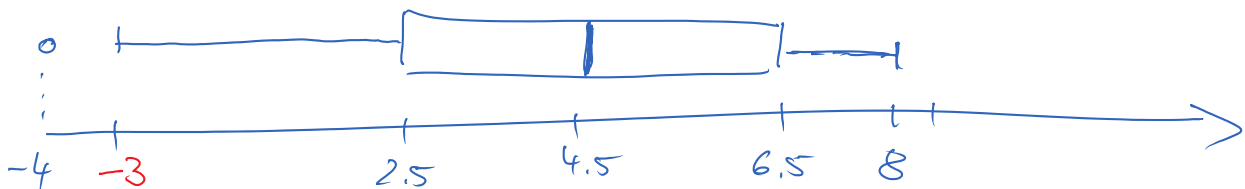
$$m = q_{0.5} = \frac{x'_6 + x'_7}{2} = \frac{4 + 5}{2} = 4.5$$

$$\left. \begin{array}{l} q_{0.25} = 2.5 \\ q_{0.75} = 6.5 \end{array} \right\} \Rightarrow IQR = 6.5 - 2.5 = 4$$

$$1.5 IQR = 6$$

obere Whisker: $q_{0.75} + 1.5 IQR = 12.5 > 8 \Rightarrow$ nehme 8
 $\parallel$
 $\max(x')$

untere Whisker: $q_{0.25} - 1.5 IQR = 2.5 - 6 = -3.5 \Rightarrow$ nehme -3



Übung

				$q_{0.25}$					m
4	5	5	10	↓	10	11	11	12	↓
12	13	13	14		15	15	25	27	
				$q_{0.75}$					

$$\left. \begin{array}{l} q_{0.25} = 10 \\ q_{0.5} = 12 \\ q_{0.75} = 14.5 \end{array} \right\} \Rightarrow IQR = 4.5 \Rightarrow 1.5 IQR = 6.75$$

obere Whisker $14.5 + 6.75 = 21.25 \rightarrow$ nehme Datenpunkt 15
untere " $10 - 6.75 = 3.25 \rightarrow$ nehme Datenpunkt 4

