Statistika

-Formule-

1. Deskriptivna statistika

$$K = 1 + 3.3 \cdot \log n \qquad d = \frac{X_{\max} - X_{\min}}{K}$$

$$f_i \qquad c_i = \sum_{j=1}^{i} f_j \qquad p_i = \frac{f_i}{n}$$

$$\overline{x} = \frac{1}{n}\sum_{i=1}^{n} X_i \qquad \overline{x} = \frac{1}{n}\sum_{i=1}^{k} x_i \cdot f_i \qquad \overline{x} = \sum_{i=1}^{k} x_i \cdot p_i$$

$$G = \sqrt[n]{x_1^{f_1} \cdot x_2^{f_2} \cdot \ldots \cdot x_k^{f_k}} \qquad \log G = \frac{1}{n}\sum_{i=1}^{k} f_i \cdot \log x_i$$

$$H = \frac{n}{\sum_{i=1}^{k} \frac{f_i}{x_i}} \qquad \frac{1}{H} = \frac{1}{n}\sum_{i=1}^{k} \frac{f_i}{x_i}$$

$$M_e = \begin{cases} X'_{\frac{n+1}{2}} \\ \frac{1}{2}\left(X'_{\frac{n}{2}} + X'_{\frac{n}{2}+1} \right) \end{cases}$$

$$M_e = a_s + \frac{a_{s+1} - a_s}{f_{s+1}} \left(\frac{n}{2} - \sum_{i=1}^{s} f_i \right)$$

$$\sum_{i=1}^{s} f_i \le \frac{n}{2} \qquad \sum_{i=1}^{s+1} f_i > \frac{n}{2}$$

$$R = X_{\max} - X_{\min}$$

$$Q = \frac{X_{0,75} - X_{0,25}}{2}$$

$$X_{0,25} = a_p + \frac{a_{p+1} - a_p}{f_{p+1}} \left(\frac{n}{4} - \sum_{i=1}^{p} f_i \right) \qquad X_{0,75} = a_q + \frac{a_{q+1} - a_q}{f_{q+1}} \left(\frac{3n}{4} - \sum_{i=1}^{q} f_i \right)$$

$$\sum_{i=1}^{p} f_i < \frac{n}{4} \qquad \sum_{i=1}^{p+1} f_i \geq \frac{n}{4} \qquad \sum_{i=1}^{q} f_i < \frac{3n}{4} \qquad \sum_{i=1}^{q+1} f_i \geq \frac{3n}{4}$$

$$e_m = \frac{1}{n} \sum_{i=1}^{k} | x_i - \overline{x} | \cdot f_i \qquad e_m = \sum_{i=1}^{k} | x_i - \overline{x} | \cdot p_i$$

$$S^2 = \frac{1}{n} \sum_{i=1}^{k} (x_i - \overline{x})^2 \cdot f_i \qquad S^2 = \left(\frac{1}{n} \sum_{i=1}^{k} x_i^{\,2} \cdot f_i \right) - \overline{x}^2$$

$$S^2 = \sum_{i=1}^{k} (x_i - \overline{x})^2 \cdot p_i \qquad S^2 = \left(\sum_{i=1}^{k} x_i^{\,2} \cdot p_i \right) - \overline{x}^2$$

$$S = +\sqrt{S^2}$$

$$V = \frac{S}{\overline{x}} \cdot 100\%$$

$$\beta_1 = \frac{\mu_3}{S^3} \qquad \mu_3 = \frac{1}{n} \sum_{i=1}^{k} \left(x_i - \overline{x} \right)^3 \cdot f_i$$

$$\beta_2 = \frac{\mu_4}{S^4} \qquad \mu_4 = \frac{1}{n} \sum_{i=1}^{k} \left(x_i - \overline{x} \right)^4 \cdot f_i$$

2. Parametarske statistike

$$\tau = Z^* = \frac{\overline{x} - m}{\frac{\sigma}{\sqrt{n}}} : N(0,1)$$

$$\tau = t = \frac{\overline{x} - m}{\frac{S}{\sqrt{n-1}}} : t_{n-1}$$

$$\tau = \chi^2 = \frac{nS^2}{\sigma^2} : \chi^2_{n-1}$$

$$\tau = t = \frac{(\overline{x}_1 - \overline{x}_2) - (m_1 - m_2)}{\sqrt{n_1 S_1^2 + n_2 S_2^2}} \cdot \sqrt{\frac{n_1 \cdot n_2}{n_1 + n_2}(n_1 + n_2 - 2)} : t_{n_1+n_2-2}$$

$$\tau = \frac{(\overline{x}_1 - \overline{x}_2) - (m_1 - m_2)}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}} : N(0,1)$$

$$\tau = \frac{(\overline{x}_1 - \overline{x}_2) - (m_1 - m_2)}{\sqrt{\frac{\sigma^2}{n_1} + \frac{\sigma^2}{n_2}}} = \frac{(\overline{x}_1 - \overline{x}_2) - (m_1 - m_2)}{\sigma} \sqrt{\frac{n_1 n_2}{n_1 + n_2}} : N(0,1)$$

$$\tau = \frac{(\overline{x}_1 - \overline{x}_2) - (m_1 - m_2)}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} : N(0,1)$$

$$\tau = \frac{\hat{p} - p_0}{\sqrt{p_0(1 - p_0)}} \sqrt{n} : N(0,1)$$

$$\tau = W^* = \frac{W - np}{\sqrt{np(1-p)}} : N(0,1)$$

$$\tau = \frac{r}{\sqrt{1 - r^2}} \sqrt{n-2} : t_{n-2}$$

$$\tau = \frac{\frac{1}{2}\ln\frac{1+r}{1-r} - \frac{1}{2}\ln\frac{1+\rho}{1-\rho}}{\frac{1}{\sqrt{n-3}}} : N(0,1)$$

$$\tau = \frac{(n_1-1)n_2S_2^2}{(n_2-1)n_1S_1^2} = \frac{\frac{n_2S_2^2}{n_2-1}}{\frac{n_1S_1^2}{n_1-1}} : F_{(n_2-1),(n_1-1)}$$

	Zbir kvadrata odstupanja	Broj stepeni slobode	Srednje kvadratno odstupanje
Između grupa	q_1	$k-1$	$S_1^2 = \frac{q_1}{k-1}$
Unutar grupa	q_2	$n-k$	$S_2^2 = \frac{q_2}{n-k}$
Ukupan	q	$n-1$	$S^2 = \frac{q}{n-1}$

$$\tau = F = \frac{S_1^2}{S_2^2} : F_{(k-1),(n-k)}$$

$$q = \sum_i \sum_j x_{ij}^2 - \frac{1}{n}\left(\sum_i \sum_j x_{ij}\right)^2$$

$$q_1 = \sum_i \frac{1}{n_i}\left(\sum_j x_{ij}\right)^2 - \frac{1}{n}\left(\sum_i \sum_j x_{ij}\right)^2$$

$$q_2 = q - q_1$$

3. Neparametarske statistike

$$\tau = \sum_{i=1}^{k} \frac{(m_i - np_i)^2}{np_i} : \chi_{k-1}^2$$

$$\tau = \sum_{i=1}^{k} \frac{(m_i - np_i)^2}{np_i} : \chi_{k-l-1}^2$$

$$\tau=\sum_{i=1}^{r}\sum_{j=1}^{s}\frac{\left(n_{ij}-\frac{n_{i\bullet}n_{\bullet j}}{n}\right)^2}{\frac{n_{i\bullet}n_{\bullet j}}{n}}:\chi^2_{(r-1)(s-1)}$$

$$\tau=\frac{K-\frac{n+2}{2}}{\sqrt{\frac{n(n-2)}{4(n-1)}}}:\quad N(0,1)$$

$$\tau=\frac{U-\frac{n_1n_2}{2}}{\sqrt{\frac{n_1n_2(n_1+n_2+1)}{12}}}:N(0;1)$$

$$U_1=n_1n_2+\frac{n_1(n_1+1)}{2}-R_1 \qquad U_2=n_1n_2+\frac{n_2(n_2+1)}{2}-R_2$$

$$U=\min(U_1,U_2)$$

4. Linearni regresioni modeli

$$\hat{\alpha}=\frac{\frac{1}{n}\sum X_iY_i-\bar{x}\,\bar{y}}{S_x^2}$$

$$\hat{\beta}=\bar{y}-\hat{\alpha}\bar{x}$$

$$\tau=\frac{\alpha-\alpha_0}{\hat{\sigma}}\sqrt{S_x^2(n-2)}:t_{n-2}$$

$$\hat{\sigma}^2=\frac{1}{n}\sum_{i=1}^{n}\left(Y_i-\left(\hat{\alpha}X_i+\hat{\beta}\right)\right)^2=\frac{1}{n}\left(\sum Y_i^2-\hat{\alpha}\sum Y_iX_i-\hat{\beta}\sum Y_i\right)$$

$$\tau=\frac{\hat{\beta}-\beta_0}{\hat{\sigma}\sqrt{S_x^2+\bar{x}^2}}\sqrt{(n-2)S_x^2}:t_{n-2}$$