# Vzorce - indukcia

| Rozdelenie | Pravdepodobnostná funkcia, hustota | momentová funkcia | stredná hodnota | rozptyl |
|---|---|---|---|---|
| normálne | $f(x)=\frac{1}{\sigma\sqrt{2\pi}}e^{-\frac{(x-\mu)^2}{2\sigma^2}}$ | $M_X(z)=e^{\mu z+\frac{1}{2}\sigma^2 z^2}$ | $\mu$ | $\sigma^2$ |
| alternatívne | $P(1)=\pi, \quad P(0)=1-\pi$ | $M_X(z)=\pi e^z+1-\pi$ | $\pi$ | $\pi\cdot(1-\pi)$ |
| binomické | $P_n(k)=\binom{n}{k}\pi^k(1-\pi)^{n-k} \quad k=0,1,2,...$ | $M_N(z)=(\pi e^z-\pi+1)^n$ | $n\pi$ | $n\pi(1-\pi)$ |
| Poissonovo | $P(k)=\frac{\lambda^k}{k!}e^{-\lambda} \quad k=0,1,2,...$ | $M_N(z)=e^{\lambda(e^z-1)}$ | $\lambda$ | $\lambda$ |

Rao – Cramerova nerovnosť: $$D(U_n)\geq\frac{1}{nE\left\{\left[\frac{d\ln f(x,\Theta_1,\Theta_2,...,\Theta_p}{d\Theta_i}\right]^2\right\}}$$

funkcia vierohodnosti: $L(\Theta;\mathbf{x})=\prod_{i=1}^{n}f(x_i;\Theta) \qquad l(\Theta;\mathbf{x})=\ln L(\Theta;\mathbf{x})=\sum_{i=1}^{n}\ln f(x_i;\Theta)$

intervaly spoľahlivosti:

$$P\left(\bar{x}-z_{1-\frac{\alpha}{2}}\frac{\sigma}{\sqrt{n}}<\mu<\bar{x}+z_{1-\frac{\alpha}{2}}\frac{\sigma}{\sqrt{n}}\right)=1-\alpha \qquad P\left(\bar{x}-t_{1-\frac{\alpha}{2}}\frac{\tilde{s}}{\sqrt{n}}<\mu<\bar{x}+t_{1-\frac{\alpha}{2}}\frac{\tilde{s}}{\sqrt{n}}\right)=1-\alpha$$

$$P\left(\frac{(n-1)\cdot\tilde{s}^2}{\chi^2_{1-\frac{\alpha}{2}}}<\sigma^2<\frac{(n-1)\cdot\tilde{s}^2}{\chi^2_{\frac{\alpha}{2}}}\right)=1-\alpha \qquad P(p-z_{1-\frac{\alpha}{2}}\cdot\sqrt{\frac{p(1-p)}{n}}<\pi<p+z_{1-\frac{\alpha}{2}}\cdot\sqrt{\frac{p(1-p)}{n}})=1-\alpha$$

$$P\big((\bar{x}_1-\bar{x}_2)-\Delta<\mu_1-\mu_2<(\bar{x}_1-\bar{x}_2)+\Delta\big)=1-\alpha \qquad \Delta=z_{1-\frac{\alpha}{2}}\cdot\sqrt{\frac{\sigma_1^2}{n_1}+\frac{\sigma_2^2}{n_2}}, \qquad \Delta=z_{1-\frac{\alpha}{2}}\cdot\sigma\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}$$

$$\Delta=z_{1-\frac{\alpha}{2}}\cdot\sqrt{\frac{\tilde{s}_1^2}{n_1}+\frac{\tilde{s}_2^2}{n_2}} \qquad \Delta=t_{1-\frac{\alpha}{2}(n_1+n_2-2)}\cdot\tilde{s}_p\cdot\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}, \quad \tilde{s}_p^2=\frac{(n_1-1)\cdot\tilde{s}_1^2+(n_2-1)\cdot\tilde{s}_2^2}{n_1+n_2-2},$$

$$P\left(\frac{\tilde{s}_1^2}{\tilde{s}_2^2}\cdot\frac{1}{F_{1-\frac{\alpha}{2}(n_1-1;n_2-1)}}<\frac{\sigma_1^2}{\sigma_2^2}<\frac{\tilde{s}_1^2}{\tilde{s}_2^2}\cdot\frac{1}{F_{\frac{\alpha}{2}(n_1-1;n_2-1)}}\right)=1-\alpha$$

$$P\big((p_1-p_2)-\Delta<\pi_1-\pi_2<(p_1-p_2)+\Delta\big)-1-\alpha$$
$$\Delta=z_{1-\frac{\alpha}{2}}\cdot\sqrt{\frac{p_1\cdot(1-p_1)}{n_1}+\frac{p_2\cdot(1-p_2)}{n_2}}$$

testovacie štatistiky:

$$Z=\frac{\bar{X}-\mu_0}{\frac{\sigma}{\sqrt{n}}} \qquad t=\frac{\bar{x}-\mu_0}{\frac{\tilde{s}}{\sqrt{n}}} \qquad W_1=\frac{(n-1)\cdot\tilde{s}^2}{\sigma_0^2} \qquad z=\frac{p-\pi_0}{\sqrt{\frac{\pi_0\cdot(1-\pi_0)}{n}}} \qquad Z=\frac{(\bar{X}_1-\bar{X}_2)}{\sqrt{\frac{\sigma_1^2}{n_1}+\frac{\sigma_2^2}{n_2}}}$$

$$Z = \frac{(\bar{X}_1 - \bar{X}_2)}{\sqrt{\frac{\tilde{s}_1^2}{n_1} + \frac{\tilde{s}_2^2}{n_2}}}$$

$$T = \frac{(\bar{X}_1 - \bar{X}_2)}{\tilde{s}_p \cdot \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

$$F = \frac{\tilde{s}_1^2}{\tilde{s}_2^2} \approx F_{(n_1-1;n_2-1)}$$

$$Z = \frac{(P_1 - P_2)}{\sqrt{\frac{P_1 \cdot (1-P_1)}{n_1} + \frac{P_2 \cdot (1-P_2)}{n_2}}}$$

$$F = \frac{MSA}{MSE} = \frac{\frac{SSA}{k-1}}{\frac{SSE}{n-k}} = \frac{\frac{\sum_{i=1}^{k} (\bar{y}_i - \bar{\bar{y}})^2 \cdot n_i}{k-1}}{\frac{\sum_{i=1}^{k} \sum_{j=1}^{n_i} (y_{ij} - \bar{y}_i)^2}{n-k}} \approx F_{(k-1;n-k)}$$

$$B = \frac{1}{c} \cdot \left[ (n-k) \ln \tilde{s}^2 - \sum_{i=1}^{k} (n_i - 1) \ln \tilde{s}_i^2 \right] \approx \chi^2_{(k-1)}$$

$$c = 1 + \frac{\sum_{i=1}^{k} \frac{1}{n_i - 1} - \frac{1}{n-k}}{3(k-1)} \qquad \tilde{s}^2 = \frac{\sum_{i=1}^{k} \tilde{s}_i^2 \cdot (n_i - 1)}{n-k}$$

$$W = \frac{n-k}{k-1} \cdot \frac{\sum_{i=1}^{k} n_i (\bar{Z}_i - \bar{\bar{Z}})^2}{\sum_{i=1}^{k} \sum_{j=1}^{n_i} (Z_{ij} - \bar{Z}_i)^2} \approx F_{(k-1;n-k)} \qquad Z_{ij} = \left| Y_{ij} - \bar{Y}_i \right|$$

$$\chi^2 = \sum_{i=1}^{k} \frac{(O_i - E_i)^2}{E_i} \approx \chi^2_{(k-1-p)}$$

$$d_n = \sup_x \left| F_n(x) - F(x) \right|$$

$$\chi^2 = \sum_{i=1}^{r} \sum_{j=1}^{s} \frac{(O_{ij} - E_{ij})^2}{E_{ij}} \approx \chi^2_{((r-1)\cdot(s-1))}$$

$$C = \sqrt{\frac{\chi^2}{n + \chi^2}}$$

$$\tau = \sqrt{\frac{\phi^2}{\sqrt{(r-1)\cdot(s-1)}}}$$

$$V = \sqrt{\frac{\chi^2}{n \cdot h}}$$

$$t_K = KW = \frac{12}{n \cdot (n+1)} \cdot \sum_{i=1}^{k} \frac{T_i^2}{n_i} - 3 \cdot (n+1) \approx \chi^2_{(k-1)}$$

$$t_K^* = \frac{1}{c} \cdot t_K$$

$$c = 1 - \frac{\sum_{i=1}^{p} (h_i^3 - h_i)}{n^3 - n}$$

$$t_W = T_1$$

$$t_{W,\min} = \frac{n_1}{2} \cdot (1 + n_1)$$

$$t_{W,\max} = n_1 n_2 + \frac{1}{2} \cdot n_1 \cdot (1 + n_1)$$

$$T = T_1 - \frac{n_1 \cdot (n_1 - 1)}{2}$$

$$r_S^* = 1 - \frac{6 \sum (R_{xi} - R_{yi})^2}{n \cdot (n^2 - 1) - c},$$
$$c = \frac{1}{2} \left[ \sum_k (h_{x,k}^3 - h_{x,k}) + \sum_{k'} (h_{y,k'}^3 - h_{y,k'}) \right]$$

$$t = \frac{r_S}{\sqrt{\frac{1 - r_S^2}{n-2}}} \approx t_{(n-2)}$$

$$Z = r_S \cdot \sqrt{n-1}$$

$$t_F = Q = \frac{12}{k \cdot (k+1) \cdot n} \sum_{i=1}^{k} T_i^2 - 3(k+1) \cdot n \approx \chi^2_{(k-1)}$$

$$t_F^* = \frac{1}{c} \cdot t_F$$

$$c = 1 - \frac{\sum_{i=1}^{p} (h_i^3 - h_i)}{n \cdot (k^3 - k)}$$