STATISTIČKE METODE

FORMULE

$$\sum x_1^2 = \sum X_1^2 - \frac{(\sum X_1)^2}{n} \qquad \sum x_2^2 = \sum X_2^2 - \frac{(\sum X_2)^2}{n}$$

$$\sum x_1 y = \sum X_1 Y - \frac{(\sum X_1)(\sum Y)}{n} \qquad \sum x_2 y = \sum X_2 Y - \frac{(\sum X_2)(\sum Y)}{n}$$

$$\sum x_1 x_2 = \sum X_1 X_2 - \frac{\sum X_1 \sum X_2}{n} \qquad \sum y^2 = \sum Y^2 - \frac{(\sum Y)^2}{n}$$

$$b_1 = \frac{\sum x_2^2 \sum x_1 y - \sum x_1 x_2 \sum x_2 y}{\sum x_1^2 \sum x_2^2 - (\sum x_1 x_2)^2} \qquad b_2 = \frac{\sum x_1^2 \sum x_2 y - \sum x_1 x_2 \sum x_1 y}{\sum x_1^2 \sum x_2^2 - (\sum x_1 x_2)^2}$$

$$a = \overline{Y} - b_1 \overline{X}_1 - b_2 \overline{X}_2$$

$$C_{11} = \frac{\sum x_2^2}{C} \qquad C_{22} = \frac{\sum x_1^2}{C} \qquad C_{12} = -\frac{\sum x_1 x_2}{C} \qquad C = \sum x_1^2 \sum x_2^2 - (\sum x_1 x_2)^2$$

$$b_1 = C_{11} \sum x_1 y + C_{12} \sum x_2 y \qquad b_2 = C_{21} \sum x_1 y + C_{22} \sum x_2 y$$

$$Q = \sum Y^2 - \frac{(\sum Y)^2}{n} \qquad Q_R = b_1 \sum x_1 y + b_2 \sum x_2 y \qquad Q_P = \sum_{i=1}^{n} (Y_i - \hat{Y}_i)^2 = Q - Q_R$$

$$s_e = \sqrt{\frac{\sum_{i=1}^{n} (Y_i - \hat{Y}_i)^2}{n-p-1}} \qquad F = \frac{\frac{Q_R}{p}}{\frac{Q_P}{n-p-1}} = \frac{s_R^2}{s_e^2} \qquad t_1 = \frac{b_1}{s_{b_1}} \qquad t_2 = \frac{b_2}{s_{b_2}} \qquad t_i = \frac{b_i}{s_{b_i}}$$

$$s_{b_1} = \sqrt{s_e^2 C_{11}} \qquad s_{b_2} = \sqrt{s_e^2 C_{22}} \qquad s_{b_i} = \sqrt{s_e^2 C_{ii}}$$

$$b_i - t_{(n-p-1);\alpha} \cdot s_{b_i} < \beta_i < b_i + t_{(n-p-1);\alpha} \cdot s_{b_i}$$

$$s_d = \sqrt{s_e^2 \left(C_{11} - 2C_{12} + C_{22}\right)} \qquad t = \frac{b_1 - b_2}{s_d}$$

$$s_a = \sqrt{\frac{s_e^2}{n}} \qquad \overline{Y} - t_{n-p-1;\alpha} \cdot s_a < \mu < \overline{Y} + t_{n-p-1;\alpha} \cdot s_a$$

$$\hat{Y}_0 - t_{n-p-1;\alpha} \cdot s_{\hat{Y}_0} < \mu_0 < \hat{Y}_0 + t_{n-p-1;\alpha} \cdot s_{\hat{Y}_0}$$

$$s_{\hat{Y}_0} = \sqrt{s_e^2 \cdot \left[\frac{1}{n} + C_{11} \cdot (X_{10} - \overline{X}_1)^2 + C_{22} \cdot (X_{20} - \overline{X}_2)^2 + 2 \cdot C_{12} \cdot (X_{10} - \overline{X}_1)(X_{20} - \overline{X}_2)\right]}$$

$$\hat{Y}_0 - t_{n-p-1;\alpha} \cdot s_{Y_0'} < Y_0 < \hat{Y}_0 + t_{n-p-1;\alpha} \cdot s_{Y_0'} \qquad s_{Y_0'}^2 = s_{\hat{Y}_0}^2 + s_e^2$$

STATISTIČKE METODE

$$b_i' = \frac{b_i \cdot s_{X_i}}{s_Y} \qquad s_{X_i} = \sqrt{\frac{\sum x_i^2}{n-1}}, i = 1,2 \qquad s_Y = \sqrt{\frac{\sum y^2}{n-1}}$$

$$R^2 = \frac{Q_R}{Q} \qquad R = \sqrt{R^2} \qquad R^2 = b_1'^2 + b_2'^2 + 2 \cdot b_1' \cdot b_2' \cdot r_{23} \qquad F = \frac{R^2 \cdot (n-p-1)}{(1-R^2) \cdot p}$$

$$R_A^2 = 1 - \frac{n-1}{n-p-1} \cdot \frac{Q_P}{Q} \qquad R_A^2 = 1 - \frac{n-1}{n-p-1} \cdot (1-R^2)$$

$$R^2 = \frac{r_{12}^2 + r_{13}^2 - 2r_{12}r_{13}r_{23}}{1-r_{23}^2}$$

$$r_{X_1X_2} = r_{23} = \frac{\sum x_1x_2}{\sqrt{\sum x_1^2}\sqrt{\sum x_2^2}} \quad r_{X_1Y} = r_{12} = \frac{\sum x_1 y}{\sqrt{\sum x_1^2}\sqrt{\sum y^2}} \quad r_{X_2Y} = r_{13} = \frac{\sum x_2 y}{\sqrt{\sum x_2^2}\sqrt{\sum y^2}}$$

$$b_1 = b_{12.3} = \frac{s_1}{s_2} \cdot \frac{r_{12} - r_{13}r_{23}}{1-r_{23}^2} \qquad b_2 = b_{13.2} = \frac{s_1}{s_3} \cdot \frac{r_{13} - r_{12}r_{23}}{1-r_{23}^2} \qquad b_1' = \frac{r_{12} - r_{13}r_{23}}{1-r_{23}^2} \qquad b_2' = \frac{r_{13} - r_{12}r_{23}}{1-r_{23}^2}$$

$$s_{b_1} = \sqrt{\frac{s_e^2}{\sum x_1^2 (1-r_{23}^2)}} \qquad s_{b_2} = \sqrt{\frac{s_e^2}{\sum x_2^2 (1-r_{23}^2)}}$$

$$r_{12.3} = \frac{r_{12} - r_{13}r_{23}}{\sqrt{1-r_{13}^2}\sqrt{1-r_{23}^2}} \qquad r_{13.2} = \frac{r_{13} - r_{12}r_{23}}{\sqrt{1-r_{12}^2}\sqrt{1-r_{23}^2}}$$

$$t_1 = \frac{r_{12.3}}{\sqrt{1-r_{12.3}^2}}\sqrt{n-3} \qquad t_2 = \frac{r_{13.2}}{\sqrt{1-r_{13.2}^2}}\sqrt{n-3}$$

$$R^2 = r_{12}^2 + r_{13.2}^2(1-r_{12}^2) \qquad R^2 = r_{13}^2 + r_{12.3}^2(1-r_{13}^2)$$

$$F = \frac{Q_R - Q_R'}{s_e^2}$$

$$\sum Y = a \cdot n + b\sum X + c\sum X^2, \qquad \sum Y = a \cdot n + c\sum X^2,$$

$$\sum XY = a\sum X + b\sum X^2 + c\sum X^3, \qquad \sum XY = b\sum X^2,$$

$$\sum X^2Y = a\sum X^2 + b\sum X^3 + c\sum X^4. \qquad \sum X^2Y = a\sum X^2 + c\sum X^4.$$

$$Q = \sum y^2 = \sum Y^2 - \frac{(\sum Y)^2}{n}$$

$$Q_R = a\sum Y + b\sum XY + c\sum X^2Y - \frac{(\sum Y)^2}{n} \qquad a = \overline{Y} - b\overline{X} - c(\overline{X})^2 \qquad X_{min(max)} = -\frac{b}{2c}$$

$$s_e^2 = \frac{\sum (Y-\hat{Y})^2}{n-3} \qquad \rho = \sqrt{1 - \frac{\sum (Y-\hat{Y})^2}{\sum (Y-\overline{Y})^2}}$$

$$Y = \alpha\beta^X\varepsilon \qquad \ln Y = \ln\alpha + X\cdot\ln\beta + \eta \qquad Z = \ln Y, \quad A = \ln\alpha, \; B = \ln\beta$$

$$\hat{Y} = ab^X \qquad \hat{Z} = A + BX \qquad A = \ln a \qquad B = \ln b$$

$$B = \frac{\sum XZ - \frac{\sum X \sum Z}{n}}{\sum X^2 - \frac{(\sum X)^2}{n}} \qquad A = \overline{Z} - B\overline{X} \qquad B = \frac{\sum ZX}{\sum X^2} \qquad A = \overline{Z} \qquad p = (b-1)\cdot 100\%$$

$$Q_R = \frac{\left(\sum XZ - \frac{\sum X \sum Z}{n}\right)^2}{\sum X^2 - \frac{(\sum X)^2}{n}} \qquad Q = \sum Z^2 - \frac{(\sum Z)^2}{n} \qquad s_B = \sqrt{\frac{s_e^2}{\sum X^2 - \frac{(\sum X)^2}{n}}}$$

$$s_e = \sqrt{\frac{\sum_{i=1}^{n}(Z_i - \hat{Z}_i)^2}{n-2}} \qquad s_e = \sqrt{\frac{Q_P}{n-2}}$$

$$Y = \alpha X^\beta \varepsilon \qquad \ln Y = \ln\alpha + \beta \ln X + \eta \qquad Z = \ln Y, \; W = \ln X, \quad A = \ln\alpha$$

$$\hat{Y} = aX^b \qquad \hat{Z} = A + bW \qquad A = \ln a$$

$$b = \frac{\sum WZ - \frac{\sum W \sum Z}{n}}{\sum W^2 - \frac{(\sum W)^2}{n}} \qquad A = \overline{Z} - b\overline{W} \qquad Q_R = \frac{\left(\sum WZ - \frac{\sum W \sum Z}{n}\right)^2}{\sum W^2 - \frac{(\sum W)^2}{n}}$$

$$Y = \alpha + \beta\cdot\frac{1}{X} + \varepsilon \qquad W = \frac{1}{X} \qquad \hat{Y} = a + bW \qquad b = \frac{\sum WY - \frac{\sum W \sum Y}{n}}{\sum W^2 - \frac{(\sum W)^2}{n}}$$

STATISTIČKE METODE

$$\overline{Y}_{st}=\frac{\sum_{h=1}^{L}N_h\overline{Y}_h}{\sum_{h=1}^{L}N_h}\qquad \overline{y}_{st}=\frac{\sum_{h=1}^{L}N_h\overline{y}_h}{\sum_{h=1}^{L}N_h}\qquad \hat{Y}_h=N_h\overline{y}_h\qquad \hat{Y}_{st}=N\overline{y}_{st}$$

$$\sigma^2_{\overline{y}_{st}}=\sum_{h=1}^{L}\frac{N_h^2}{N^2}\frac{\sigma_h^2}{n_h}\qquad \sigma^2_{\overline{y}_{st}}=\sum_{h=1}^{L}\frac{N_h^2}{N^2}\frac{N_h-n_h}{N_h-1}\frac{\sigma_h^2}{n_h}$$

$$s^2_{\overline{y}_{st}}=\sum_{h=1}^{L}\frac{N_h^2}{N^2}\frac{s_h^2}{n_h}\qquad s^2_{\overline{y}_{st}}=\sum_{h=1}^{L}\frac{N_h^2}{N^2}\frac{N_h-n_h}{N_h}\frac{s_h^2}{n_h}\qquad s_h^2=\frac{\sum_{i=1}^{n_h}y_i^2-\frac{\left(\sum_{i=1}^{n_h}y_i\right)^2}{n_h}}{n_h-1}$$

$$\hat{Y}_h=N_h\overline{y}_h$$

$$\overline{y}_{st.p}=\sum\frac{n_h}{n}\overline{y}_h\qquad s^2_{\overline{y}_{st.p}}=\frac{N-n}{N}\sum_{h=1}^{L}\frac{N_h}{N}\frac{s_h^2}{n}\qquad s^2_{\overline{y}_{st.p}}=\sum_{h=1}^{L}\frac{N_h}{N}\frac{s_h^2}{n}\qquad s^2_{\overline{y}_{st.p}}=\sum_{h=1}^{L}\frac{n_h}{n}\frac{s_h^2}{n}$$

$$p_{st}=\frac{\sum_{h=1}^{L}N_hp_h}{\sum_{h=1}^{L}N_h}\qquad \hat{p}_{st}=\frac{\sum_{h=1}^{L}N_h\hat{p}_h}{\sum_{h=1}^{L}N_h}\qquad \sigma^2_{\hat{p}_{st}}=\sum_{h=1}^{L}\frac{N_h^2}{N^2}\frac{p_hq_h}{n_h}\qquad \sigma^2_{\hat{p}_{st}}=\sum_{h=1}^{L}\frac{N_h^2}{N^2}\frac{p_hq_h}{n_h}\frac{N_h-n_h}{N_h-1}$$

$$s^2_{\hat{p}_{st}}=\sum_{h=1}^{L}\frac{N_h^2}{N^2}\frac{\hat{p}_h\hat{q}_h}{n_h-1}\qquad s^2_{\hat{p}_{st}}=\sum_{h=1}^{L}\frac{N_h^2}{N^2}\frac{\hat{p}_h\hat{q}_h}{n_h-1}\frac{N_h-n_h}{N_h}$$

$$P(A)=\frac{m(A)}{n}\qquad P(A)=\lim_{n\to\infty}\frac{f}{n}$$

$$P(A\cup B)=P(A)+P(B)-P(A\cap B)$$

$$P(A\cup B\cup C)=P(A)+P(B)+P(C)-P(A\cap B)-P(A\cap C)-P(B\cap C)+P(ABC)$$

$$P(A\mid B)=\frac{P(A\cap B)}{P(B)},\ P(B)>0$$

$$P(B)=\sum_{i=1}^{n}P(B\mid A_i)P(A_i),\ (\forall\ i,j)\ A_i\cap A_j=\varnothing,\ S=\bigcup_{i=1}^{n}A_i,\ B\subset S$$

$$P(A_i\mid B)=\frac{P(B\mid A_i)\cdot P(A_i)}{\sum_{i=1}^{n}P(B\mid A_i)\cdot P(A_i)}$$

$$F(x)=P(X\le x)=P(-\infty<X\le x)$$

$$E(X)=\sum_i x_ip_i\quad V(X)=E(X^2)-[E(X)]^2$$

$$\operatorname{cov}(X,Y)=E(XY)-E(X)E(Y)$$

$$V(X\pm Y)=V(X)\pm 2\operatorname{cov}(X,Y)+V(Y)\quad \operatorname{cov}(X,Y)=\sum_i\sum_j x_iy_jp_{ij}-\sum_i x_ip_{i.}\sum_j y_jp_{.j},$$

$$\hat{p} = \frac{\sum_{i=1}^{k} m_i}{k \cdot n} = \frac{\sum \hat{p}_i}{k} \qquad s_{\hat{p}} = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \qquad GG = \hat{p} + 3 \cdot s_{\hat{p}},\ \ DG = \hat{p} - 3 \cdot s_{\hat{p}}.$$

$$\bar{c} \pm 3 \cdot \sqrt{\bar{c}}$$

$$\overline{X} = \frac{\sum_{i=1}^{k} \overline{X}_i}{k} \qquad \overline{X} \pm 3 \cdot \frac{\bar{I}}{\sqrt{n} \cdot d_n} = \overline{X} \pm \bar{I} \cdot A$$

$$DG = B_1 \cdot \bar{I} \qquad B_1 = 1 - 3 \cdot \frac{f_n}{d_n}$$

$$GG = B_2 \cdot \bar{I} \qquad B_2 = 1 + 3 \cdot \frac{f_n}{d_n}$$

Табличне вредности за формирање контролне карте

n	d_n	f_n	A	B_1	B_2
4	2.06	0.880	0.729	0	**2.28**
5	2.33	0.864	0.577	0	**2.11**
6	2.53	0.848	0.483	0	**2.00**
7	2.70	0.833	0.419	0.076	**1.92**
8	2.85	0.820	0.373	0.136	**1.86**
9	2.97	0.808	0.337	0.184	**1.82**
10	**3.08**	**0.797**	**0.308**	**0.223**	**1.78**