List of statistical formulas without description

Data sampling & sorting

$$f_i = \frac{n_i}{n} \cdot 100[\%]$$

$$N_1 = n_1; N_2 = N_1 + n_2; N_3 = N_2 + n_3; ...$$

$$F_1 = f_1; F_2 = F_1 + f_2; F_3 = F_2 + f_3; ...$$

$$h = \frac{(\max - \min)}{m}$$

$$m = \sqrt{n}$$

Descriptive statistics

$$\mu = \frac{\sum x_i}{N} \text{ or } \mu = \frac{\sum x_i \cdot n_i}{N}$$

$$\bar{x} = \frac{\sum x_i}{n} \text{ or } \bar{x} = \frac{\sum x_i \cdot n_i}{n}$$

IQR = Q3 – Q1

R = max – min

$$\sigma^2 = \frac{\sum (x_i - \mu)^2}{N} \text{ or } \sigma^2 = \frac{\sum (x_i - \mu)^2 \cdot n_i}{N}$$

$$s^2 = \frac{\sum (x_i - \bar{x})^2}{n-1} \text{ or } s^2 = \frac{\sum (x_i - \bar{x})^2 \cdot n_i}{n-1}$$

$$\sigma = \sqrt{\sigma^2}$$

$$s = \sqrt{s^2}$$

$$CV_s = \frac{s}{\bar{x}} \cdot 100[\%]$$

$$\gamma_1 = \frac{\sum (x_i - \bar{x})^3}{s^3 \cdot n} \text{ or } \gamma_1 = \frac{\sum (x_i - \bar{x})^3 \cdot n_i}{s^3 \cdot n}$$

$$\gamma_2 = \frac{\sum (x_i - \bar{x})^4}{s^4 \cdot n} - 3 \text{ or } \gamma_2 = \frac{\sum (x_i - \bar{x})^4 \cdot n_i}{s^4 \cdot n} - 3$$

Theory of probability

no formulas

Point and interval estimate

$$est\, \mu = \bar{x}$$

$$est\ \sigma^2 = s_1^2$$

$$est\ \sigma = s_1$$

$$P(\bar{x} - \Delta < \mu < \bar{x} + \Delta) = 1 - \alpha$$

$$\Delta = u_{(1-\alpha/2)} \cdot \frac{s_1}{\sqrt{n}}$$

$$\Delta = t_{(\alpha;n-1)} \cdot \frac{s_1}{\sqrt{n}}$$

$$P\left(\frac{(n-1) \cdot s_1^2}{\chi^2_{(\alpha/2;n-1)}} < \sigma^2 < \frac{(n-1) \cdot s_1^2}{\chi^2_{(1-\alpha/2;n-1)}}\right) = 1 - \alpha$$

$$P\left(\sqrt{\frac{(n-1) \cdot s_1^2}{\chi^2_{(\alpha/2;n-1)}}} < \sigma^2 < \sqrt{\frac{(n-1) \cdot s_1^2}{\chi^2_{(1-\alpha/2;n-1)}}}\right) = 1 - \alpha$$

$$n = u^2_{(1-\alpha/2)} \cdot \frac{s_1^2}{\Delta^2}$$

Hypothesis testing (tests for mean)

$$u = \frac{\bar{x} - \mu_0}{\frac{s_1}{\sqrt{n}}}$$

$$t = \frac{\bar{x} - \mu_0}{\frac{s_1}{\sqrt{n}}}$$

$$u = \frac{\bar{x}_1 - \bar{x}_2 - (\mu_1 - \mu_2)}{\sqrt{\frac{n_2 s_{11}^2 + n_1 s_{12}^2}{n_1 . n_2}}} = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{n_2 s_{11}^2 + n_1 s_{12}^2}{n_1 . n_2}}}$$

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{(n_1 - 1) s_{11}^2 + (n_2 - 1) s_{12}^2}{n_1 + n_2 - 2}}} . \sqrt{\frac{n_1 . n_2}{n_1 + n_2}}$$

$$t = \frac{\bar{d}}{\sqrt{\frac{\sum_{i=1}^{n} \left(d_i - \bar{d}\right)^2}{n \cdot (n-1)}}}$$

Hypothesis testing (tests for variance)

$$\chi^2 = \frac{(n-1) \cdot s_1^2}{\sigma_0^2}$$

$$F = \frac{s_{11}^2}{s_{12}^2}$$

Analysis of variance (ANOVA)

no formulas

Chi-square test for independence

$$\chi^2 (\alpha; (\mathrm{m}-1) \cdot (k-1)) = \sum_{\mathrm{i}=1}^{\mathrm{m}} \sum_{\mathrm{j}=1}^{\mathrm{k}} \frac{((\mathrm{a_i} b_j) - (\mathrm{a_i} b_j)_0)^2}{(\mathrm{a_i} b_j)_0}$$

$$\chi^2 (\alpha; (\mathrm{m}-1) \cdot (k-1)) = \sum_{\mathrm{i}=1}^{\mathrm{m}} \sum_{\mathrm{j}=1}^{\mathrm{k}} \frac{(\mathrm{O} - \mathrm{E})^2}{\mathrm{E}}$$

$$\left(a_i b_j\right)_0 = \frac{a_i \cdot b_j}{n}$$

$$V = \sqrt{\frac{\chi^2}{n(\min((m,k)-1)}}$$

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

$$T^2 = \frac{\chi^2}{n(\sqrt{(m-1)(k-1)}}$$

Regression and correlation analysis

$$t_{(\alpha;n-2)} = \frac{r}{\sqrt{\frac{1-r^2}{n-2}}}$$