Tilastomenetelmien perusteet, kaavakokoelma

1 TESTISUUREITA

(1.1) $$\chi^2 = \sum_{i=1}^{k} \frac{(f_i - e_i)^2}{e_i} \sim \chi^2_{k-1}$$

(1.2) $$\chi^2 = \sum_{i=1}^{I} \sum_{j=1}^{J} \frac{(f_{ij} - e_{ij})^2}{e_{ij}} \sim \chi^2_{(I-1)(J-1)}$$

(1.3) $$\chi^2 = \frac{n(f_{11}f_{22} - f_{12}f_{21})^2}{f_{\cdot 1}f_{\cdot 2}f_{1\cdot}f_{2\cdot}} \sim \chi^2_1$$

$H_0\colon \rho = 0$

(1.4) $$t = \frac{r_{xy}}{\sqrt{(1 - r_{xy}^2)/(n-2)}} \sim t_{n-2}, \qquad \text{missä } r_{xy} = \frac{\sum_{i=1}^n (x_i - \overline{x})(y_i - \overline{y})}{\sqrt{\sum_{i=1}^n (x_i - \overline{x})^2 \sum_{i=1}^n (y_i - \overline{y})^2}}$$

2 VARIANSSIANALYYSI

1-suuntainen

(2.1) $$SST = SSB + SSW$$

(2.2) $$\sum_{i=1}^{I} \sum_{j=1}^{n_i} (Y_{ij} - \overline{Y})^2 = \sum_{i=1}^{I} n_i(\overline{Y}_i - \overline{Y})^2 + \sum_{i=1}^{I} \sum_{j=1}^{n_i} (Y_{ij} - \overline{Y}_i)^2$$

	SS	df	MS	F $\quad (H_0\colon \mu_1 = \mu_2 \cdots = \mu_I)$
välinen	SSB	$I-1$	$MSB = SSB/(I-1)$	$F = MSB/MSW \sim F_{I-1,n-I}$, kun H_0 tosi
sisäinen	SSW	$n-I$	$MSW = SSW/(n-I)$	$(F = t^2,$ jos $I = 2)$
kokonais	SST	$n-1$		

2-suuntainen

	SS	df	MS	F
A:n omavaikutus	SS_A	df_A	$MS_A = SS_A/df_A$	$F_A = MS_A/MSE \sim F_{df_A, df_{SSE}}$
B:n omavaikutus	SS_B	df_B	$MS_B = SS_B/df_B$	$F_B = MS_B/MSE \sim F_{df_B, df_{SSE}}$
A:n ja B:n yhdysvaikutus	SS_{AB}	df_{AB}	$MS_{AB} = SS_{AB}/df_{AB}$	$F_{AB} = MS_{AB}/MSE \sim F_{df_{AB}, df_{SSE}}$
jäännös	SSE	df_{SSE}	$MSE = SSE/df_{SSE}$	
kokonais	SST			

3 REGRESSIOANALYYSI

(3.1) $$Y = \beta_0 + \beta_1 x + \varepsilon$$

(3.2) $$\hat{\beta}_0 = \overline{y} - \hat{\beta}_1 \overline{x}$$

(3.3) $$\hat{\beta}_1 = \frac{\sum_{i=1}^{n}(x_i - \overline{x})(y_i - \overline{y})}{\sum_{i=1}^{n}(x_i - \overline{x})^2} = \frac{\sum_{i=1}^{n} x_i y_i - \left(\sum_{i=1}^{n} x_i\right)\left(\sum_{i=1}^{n} y_i\right)/n}{\sum_{i=1}^{n} x_i^2 - \left(\sum_{i=1}^{n} x_i\right)^2/n}$$

(3.4) $$\hat{y}_i = \hat{\beta}_0 + \hat{\beta}_1 x_i, \qquad \text{missä } i = 1, 2, \ldots, n$$

<u>$H_0\colon \beta_1 = 0$</u>

(3.5) $$t = \frac{\hat{\beta}_1}{s(\hat{\beta}_1)} \sim t_{n-2}, \qquad \text{missä } s(\hat{\beta}_1) \text{ on } \hat{\beta}_1\text{:n estimoitu hajonta}$$

<u>$H_0\colon \beta_0 = 0$</u>

(3.6) $$t = \frac{\hat{\beta}_0}{s(\hat{\beta}_0)} \sim t_{n-2}, \qquad \text{missä } s(\hat{\beta}_0) \text{ on } \hat{\beta}_0\text{:n estimoitu hajonta}$$

(3.7) $$SST = SSR + SSE$$

(3.8) $$\sum_{i=1}^{n}(y_i - \overline{y})^2 = \sum_{i=1}^{n}(\hat{y}_i - \overline{y})^2 + \sum_{i=1}^{n}(y_i - \hat{y}_i)^2$$

(3.9) $$R^2 = \frac{SSR}{SST}$$

(3.10) $$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k + \varepsilon$$

<u>$H_0\colon \beta_i = 0$</u>

(3.11) $$t = \frac{\hat{\beta}_i}{s(\hat{\beta}_i)} \sim t_{n-k-1}, \qquad \text{missä } s(\hat{\beta}_i) \text{ on } \hat{\beta}_i\text{:n estimoitu hajonta}$$

(3.12) $$MSR = SSR/k$$

(3.13) $$MSE = \frac{SSE}{n-k-1}$$

<u>$H_0\colon \beta_1 = \beta_2 = \cdots = \beta_k = 0$</u>

(3.14) $$F = \frac{MSR}{MSE} \sim F_{k,n-k-1}$$