WELCH CONFIDENCE INTERVAL

↳ antar populasi independen

confidence interval for an α level :

$$P\left[(\bar{x}_1 - \bar{x}_2) - hw \leq \mu_1 - \mu_2 \leq (\bar{x}_1 - \bar{x}_2) + hw\right] = 1 - \alpha.$$

$$hw = \text{half width} = t_{df,\,\alpha/2}\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

$$df \approx \frac{\left[\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right]^2}{\frac{\left[\frac{s_1^2}{n_1}\right]^2}{(n_1 - 1)} + \frac{\left[\frac{s_2^2}{n_2}\right]^2}{(n_2 - 1)}}$$

Contoh → $\alpha = 0.05$ (LIHAT TABEL 10.1).

$$df \approx \frac{\left[\frac{1.89}{10} + \frac{1.36}{10}\right]^2}{\frac{\left[\frac{1.89}{10}\right]^2}{(10-1)} + \frac{\left[\frac{1.36}{10}\right]^2}{(10-1)}} \approx 17.5.$$

$$hw = t_{17.5,\,0.025}\sqrt{\frac{1.89}{10} + \frac{1.36}{10}} = 1.2 \text{ parts/hour}$$

$$(\bar{x}_1 - \bar{x}_2) - hw \leq \mu_1 - \mu_2 \leq (\bar{x}_1 - \bar{x}_2) + hw.$$

$$(56.30 - 54.63) - 1.2 \leq \mu_1 - \mu_2 \leq (56.30 - 54.63) + 1.2.$$

$$0.47 \leq \mu_1 - \mu_2 \leq 2.87$$

Konklusi : - interval tidak mengandung angka $\emptyset$ → ada perbedaan signifikan rata² "throughput" dr 2 strategi tsb.

- μ_1 (strategi pertama) lebih unggul dibanding strategi ke-2.

PAIRED t CONFIDENCE INTERVAL

Ke antar populasi tidak perlu independen.

sample mean $= \bar{x}_{(1-2)} = \sum_{j=1}^{n} x_{(1-2)j}$

sample standard deviation $= s_{(1-2)} = \sqrt{\frac{\sum_{j=1}^{n} [x_{(1-2)j} - \bar{x}_{(1-2)}]^2}{n-1}}$

$$hw = \frac{(t_{n-1,\alpha/2})\, s_{(1-2)}}{\sqrt{n}}$$

$$P(\bar{x}_{(1-2)} - hw \leq \mu_{(1-2)} \leq \bar{x}_{(1-2)} + hw) = 1 - \alpha.$$

Contoh $\rightarrow$ $\alpha = 0.05$ (LIHAT TABEL (D.2).

$$\bar{x}_{(1-2)} = \frac{\sum_{j=1}^{10} x_{(1-2)j}}{10} = 1.67 \text{ parts/hr}.$$

$$s_{(1-2)} = \sqrt{\frac{\sum_{j=1}^{10} [x_{(1-2)j} - 1.67]^2}{10-1}} = 1.85 \text{ parts/hr}.$$

$$hw = \frac{t_{9,\,0.025}\,(1.85)}{\sqrt{10}} = 1.32 \text{ parts/hr}.$$

$$\bar{x}_{(1-2)} - hw \leq \mu_{(1-2)} \leq \bar{x}_{(1-2)} + hw.$$

$$1.67 - 1.32 \leq \mu_{(1-2)} \leq 1.67 + 1.32$$

$$0.35 \leq \mu_{(1-2)} \leq 2.99.$$

Kesimpulan : idem "welch" $\rightarrow$ lihat hal 1.

BONFERRONI APPROACH.

$$\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = 0.05.$$

Mk kemungkinan bhw konklusi kita benar adalah

$$1 - (0.05 \times 6) = 1 - 0.30 = 0.70.$$

↑ tk kepercayaan.

0.k.i

$$\alpha_i = \frac{\alpha}{k(k-1)/2} \qquad i = 1, 2, 3 \ldots k(k-1)/2.$$

k = banyaknya alternatif.

Contoh: $H_0 : \mu_1 = \mu_2 = \mu_3 = \mu$

(LIHAT TABEL (0.3)) $H_1 = \mu_1 \neq \mu_2$ atau $\mu_1 \neq \mu_3$ atau $\mu_2 \neq \mu_3$.

$\alpha = 0.06$ $\qquad \alpha_i = \frac{\alpha}{3(3-1)/2} = \frac{0.06}{3} = 0.02.$

$\alpha_1 = \alpha_2 = \alpha_3 = 0.02.$

$\mu_{(1-2)}$ $\qquad hw = \frac{(t_{g, 0.01}) \cdot 1.85}{\sqrt{10}} = 1.65.$

$1.67 - 1.65 \leq \mu_{(1-2)} \leq 1.67 + 1.65.$

$0.02 \leq \mu_{(1-2)} \leq 3.32 \longrightarrow$ tolak H_0.

$\mu_{(1-3)} \rightarrow hw = \frac{(t_{g, 0.01}) 1.58}{\sqrt{10}} = 1.41.$

$-1.09 - 1.41 \leq \mu_{(1-3)} \leq -1.09 + 1.41.$ → terima H_0

$-250 \leq \mu_{(1-3)} \leq 0.32.$

$-3.98 \leq \mu_{(2-3} \leq -1.54 \longrightarrow$ tolak H_0.

$\mu_{(2-3)}$

Konklusi:

Pada tingkat kepercayaan 94 % → strategi 2 paling tidak menarik.