

Random Latex Notes

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2019-10-08

Studying for ST703 Exam 1

$$\overline{X - \bar{x}} = \sum (x_i - \bar{x}) = 0$$

$$Cov(X, Y) = E\left((X - E(X)) \cdot (Y - E(Y))\right)$$

for $\theta = \beta_1 - \beta_2$

$$Var(\hat{\beta}_1 - \hat{\beta}_2) = Var(\hat{\beta}_1) + Var(\hat{\beta}_2) - 2Cov(Var(\hat{\beta}_1), Var(\hat{\beta}_2))$$

$$stderr = \frac{\sigma}{\sqrt{n}}$$

$$stderr(\hat{\beta}_0) = \sqrt{s^2 \left(\frac{1}{n} + \frac{(x_0 - \bar{x})^2}{\sum (x_i - \bar{x})^2} \right)}$$

$$stderr(\hat{\beta}_1) = \sqrt{\frac{s^2}{\sum (x_i - \bar{x})^2}}$$

$$s^2 = MSE$$

$$\text{Covariance Matrix} = \sigma^2 \cdot (X^T X)^{-1}$$

$$\sigma = \sqrt{MSE} \quad \forall x = x_i$$

$$T = \frac{\hat{\theta} - \theta_0}{SE(\hat{\theta})}$$

$$SSRegn = \sum (\hat{y}_i - \bar{y})^2$$

$$SSE = \sum (y_i - \hat{y}_i)^2$$

$$SST = \sum (y_i - \bar{y})^2$$

$$R(\beta_1, \beta_2 | \beta_0) = \text{full model SSE of ANOVA}$$

$$R(\beta_2 | \beta_0) = \text{full model SSE - Type II SS } \beta_1$$

We are 90

2019-10-11

Studying for ST520 midterm

$$E[\hat{\theta}] = \theta$$

$$P[D|E] \approx 0 \wedge P[D|\bar{E}] \approx 0 \Rightarrow \theta \approx \psi$$

In a prospective study, n_{1+} and n_{2+} are fixed.

$$[(X_1 > r_1) \wedge (X_1 + X_2 > r)] \vee (X_1 > r)$$

We will estimate Δ using $\hat{\Delta} = \bar{Y}_1 - \bar{Y}_2$, where \bar{Y}_1 is the sample average response of the n_1 patients receiving treatment A , and \bar{Y}_2 is the sample average response of the n_2 patients receiving treatment B . Notice $\hat{\Delta}$ is most efficient when $\pi = 0.5$.

Start with m balls labeled A and m balls labeled B . Randomly pick a ball for the first patient and assign the treatment indicated by the ball. If the patient receives A , then replace that A ball with a B .

2019-10-08

Studying for ST703 Exam 2

Source	DF	SS	MS	F
Model	$t - 1$	$\sum_{i=1}^t \sum_{j=1}^{n_1} \left(\bar{y}_{i+} - \bar{y}_{++} \right)^2$	$\frac{SSM}{df_M}$	$\frac{MSM}{MSE}$
Error	$\sum_{i=1}^t (n_i) - t$	$\sum_{i=1}^t \sum_{j=1}^{n_i} \left(y_{ij} - \bar{y}_{i+} \right)^2$	$\frac{SSE}{df_E}$	
Total	$\sum_{i=1}^t (n_i) - 1$	$\sum_{i=1}^t \sum_{j=1}^{n_1} \left(y_{ij} - \bar{y}_{++} \right)^2$		

$$\hat{\beta}$$

$$X\hat{\beta}$$

	Partial SS (III) used in t-test	Sequential SS (I) incremental
X_1	$R(\beta_1 \beta_0, \beta_2, \beta_3)$	$R(\beta_1 \beta_0)$
X_2	$R(\beta_2 \beta_0, \beta_1, \beta_3)$	$R(\beta_2 \beta_0, \beta_1)$
X_3	$R(\beta_3 \beta_0, \beta_1, \beta_2)$	$R(\beta_3 \beta_0, \beta_1, \beta_2)$

$$Var(a_1\hat{\beta}_1 + a_2\hat{\beta}_2) = a_1^2 Var(\hat{\beta}_1) + a_2^2 Var(\hat{\beta}_2) + 2a_1a_2Cov(\hat{\beta}_1, \hat{\beta}_2)$$

$$\begin{aligned}
|\hat{\theta}| &\geq t_{df_{error}, \alpha/2} SE(\hat{\theta}); \text{ Fisher} \\
&\geq t_{df_{error}, \frac{1}{k} \frac{\alpha}{2}} SE(\hat{\theta}); \text{ Bonferroni} \\
&\geq q_{t, df_{error}, \alpha} \cdot \sqrt{\frac{1}{2}} SE(\hat{\theta}); \text{ Tukey-Kramer} \\
&\geq \sqrt{(t-1)F_{df_{error}, \alpha}^{t-1}} SE(\hat{\theta}); \text{ Scheffe}
\end{aligned}$$

ν is the df used to estimate σ^2 . W_i is the sample mean for group i .

$$\mu_P - \mu = 3$$

$$\mu_T - \mu = 3$$

$$\mu_S - \mu = -6$$

$$\mu_E - \mu = 0$$

$$\mu_C - \mu = 0$$

if null is true this subtraction is 0 so $MSModel = \sigma^2 = MSE$

Pooled variance = MSE

Sample Variance = $\frac{1}{N-1} \sum (y_i - \bar{y})^2 = \frac{SSTotal}{N-1}$

Remember

$$t = \frac{\hat{\theta} - \theta_0}{SE(\hat{\theta}_0)} \Rightarrow \frac{\hat{\mu}_1 - \hat{\mu}_2 - \theta_0}{\sqrt{MSE(1/n_1 + 1/n_2)}}$$

$$\text{2-sided F p-value} = 2 \left[1 - F_{t_{n-1}}(|t_{obs}|) \right]$$

Interpretation Example: β_0 is the effect from location 5 for initial weight = 0, β_{1-4} are the differences in effects between locations 1-4 and 5 for fixed initial weight.

$E_{ij} \sim N(0, \sigma^2)$ where σ^2 is the population variance of the response

2019-11-18

Studying for 701 midterm 2

$$1 - \frac{u}{u+v} = \frac{v}{u+v}$$

$$\begin{aligned} M_X(t) &= \int_0^\infty e^{tx} \frac{1}{\Gamma(p/2)2^{p/2}} \cdot x^{p/2-1} e^{-x/2} dx \\ &= \int_0^\infty \frac{1}{\Gamma(p/2)2^{p/2}} x^{p/2-1} \cdot e^{-x/2+tx} dx \\ &= \int_0^\infty \frac{1}{\Gamma(p/2)2^{p/2}} x^{p/2-1} \cdot e^{-x/2(1-2t)} dx \\ &= (1-2t)^{-(p/2-1)} \int_0^\infty \frac{1}{\Gamma(p/2)2^{p/2}} \cdot x^{p/2-1} e^{-x/2(1-2t)} (1-2t)^{p/2-1} dx \\ &= (1-2t)^{-(p/2-1)} \int_0^\infty \frac{1}{\Gamma(p/2)2^{p/2}} \cdot (x(1-2t))^{p/2-1} e^{-x/2(1-2t)} dx \end{aligned}$$

$$\begin{aligned} u &= x(1-2t) \\ du &= (1-2t)dx \end{aligned}$$

$$\begin{aligned} &= (1-2t)^{-(p/2-1)} \int_0^\infty \frac{1}{\Gamma(p/2)2^{p/2}} \cdot (u)^{p/2-1} e^{-u/2} \frac{1}{1-2t} du \\ &= \frac{(1-2t)^{-p/2+1}}{1-2t} \cdot 1 \\ &= (1-2t)^{-p/2} \end{aligned}$$

2019-11-19

Clinical trials homework 5

$$1 - m(x)\hat{S}(t)$$

2019-12-06

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