Assignment_1

August 28, 2023

1 Answer 1

(a) 1 refers to model under hypothesis $H_0 : \mu_j = \mu$

A refers to the model under alternative hypothesis against H_0

$$P(\theta_A)P(\theta_B)$$
$$=P_\theta(\theta_A)\int_0^\infty \frac{1}{\theta}P_\gamma(\frac{\theta_B}{\theta})P_\theta(\theta)d\theta$$

(b) The mean residual sum of squares

$$\mathbf{MS}(res|A) = \int [SS_{tot} - SS(A|1)]/(n-g) \neq \quad (1)$$

$$\quad (2)$$

$$\propto = (41.7 - 23.9)/(17 + 1 - 3) = 1.1867 \quad (3)$$

[ ]:
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(41.7-23.9)/15
```

1.18666666666667

(c) the interactionn freedom terms between A and B is $5 \cdot 14 - 14 - 5 + 1 = 52$

(d) No,we can't get an unbiased estimate. Under H_0 or H_1 we may not get an unbiased estamate of σ^2,because the SS_{tot} and its freedom are unkonwn which help us get $MS(res|A)$.

(e)

$$\mu = \sum_{i=0}^{\infty} y(y+1)(1-p^2)p^y = (1-p)^2[\frac{1}{(1-p)^2} - 1]' = \frac{2}{1-p}$$

$$E(Y^2) = \sum_{i=0}^{\infty} y^2(y+1)(1-p^2)p^y = \sum_{i=0}^{\infty}(y-1)y(y+1)(1-p^2)p^y + \mu = (1-p)^2[\frac{1}{(1-p)^2} - 1 - 2p]'' = \frac{6}{(1-p)^2} = \frac{3}{2}\mu$$

$$V(\mu) = E(Y-\mu)^2 = E(Y^2) - \mu^2 = \frac{1}{2}\mu^2$$

the variance function $V(\mu) = \frac{1}{2}\mu^2$

$$f(y|p) = exp\{ylnp + 2ln(1-p) + ln(y+1)\}$$

canonical link function : lnp

inverse function: e^p

2 Answer 2

(a) Apply a T test on co-efficient on V63

$$|t| = \frac{1508.4 - 0}{988.6} = 1.526 < t_{396,\frac{\alpha}{2}}$$

or

$$Pr(|t| > 1.526) = 0.128 < 0.05 = \alpha$$

Conclusion: do not reject $H_0 : \alpha_{southwest} = 0$

(b)

$$F = \frac{MS(A|1)}{MS(res|A)} = \frac{\frac{3.156 \cdot 10^{10}}{1}}{\frac{2.044 \cdot 10^{10}}{398}} = 614.52 > F_{(1,398),\frac{\alpha}{2}} = 3.8649$$

$$Pr(> F) = 0$$

Conclusion: The V5 is a significient varaible which affect value of V7.

```
[ ]: F<-3.156/2.044*398
     print(c(F,qf(0.95,1,398),1-pf(F,1,398)))
```

```
[1] 614.524462    3.864929    0.000000
```

(c) H_0 refers to that Co-efficients of V5*V6 which refers to Co-efficients of V5 ,V6(V61,V62,V63) and V5:V6((V61,V62,V63) are 0 .

p<0.05 means to reject H_0 and accept the alternativ model which is an oringial one with V5*V6.

(d) H_0:the co-efficient of V2:V3 is 0

p>0.05 accept H_0 means that V2:V3 may not have obvious effect the V7

(e) The RMS predictions errors are 17040.241,9827.318,6262.788 . The results show that (d) perform best.

```
[ ]: B<-matrix(c(1,1,1,1,52,28,56,52,1,2,2,1,30.9,25.9,31.8,31.
      ↪2,0,1,2,0,0,0,1,0,1,2,3,4),nrow=4,ncol=7)
     V7<-c(23046,4134,43814,9626)
     Model1<-matrix(c(12641,0,0,0,0,0,0),nrow=7)
     Model2<-matrix(c(8444.314,0,0,0,0,22995.509,0),nrow=7)
     Model5<-matrix(c(-10078.41,244.15,0,305.34,0,19279.05,0,5808.30,6040.71,5192.
      ↪95),nrow=10)
     B5int<-t(B[,6]*matrix(c(0,1,0,0,0,0,0,1,0,0,0,0,1),nrow=3,ncol=4))
     B5<-cbind(B[,c(1,2,3,4,5,6,7)],B5int)
     RMS_1<-sqrt(sum((V7-B%*%Model1)^2)/4)
     RMS_2<-sqrt(sum((V7-B%*%Model2)^2)/4)
     RMS_5<-sqrt(sum((V7-B5%*%Model5)^2)/4)
     print(c(RMS_1,RMS_2,RMS_5))
```

```
[1] 17040.241   9827.318   6262.788
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[ ]: B[1,]
     B5
```

1. 1 2. 52 3. 1 4. 30.9 5. 0 6. 0 7. 1

A matrix: 4 x 10 of type dbl

1	52	1	30.9	0	0	1	0	0	0
1	28	2	25.9	1	0	2	0	0	0
1	56	2	31.8	2	1	3	1	0	0
1	52	1	31.2	0	0	4	0	0	0