TMA4315 Generalized linear regression

Module 4: Count and continuous positive response data

October 4, 2018

What is the canonical link for the Poisson distribution with $\mathrm{E}(Y) = \lambda$?

A $\exp(\lambda)$

B $\ln(\lambda)$

C $\ln(\frac{\lambda}{1-\lambda})$

D $\frac{\exp(\lambda)}{\exp(\lambda)+1}$

What is the canonical link for the gamma distribution?

A μ

B $\ln(\mu)$

C $-\exp(\mu)$

D $-\frac{1}{\mu}$

Is this Poisson regression a good model?

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Null deviance:
632.79  on 172  degrees of freedom
Residual deviance:
567.88  on 171  degrees of freedom
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What is this method called?

$$\beta^{(t+1)} = \beta^{(t)} + H(\beta^{(t)})^{-1} \boldsymbol{s}(\beta^{(t)})$$

A Newton-Raphson

B Wald

C Score

D Fisher scoring

We estimate β by maximum likelihood. What is the asymptotic distribution of $\hat{\beta}$

A $N_p(\beta, \phi F(\hat{\beta}))$

B $N_p(\beta, F^{-1}(\hat{\beta}))$

C $N_p(\beta, F(\hat{\beta}))$

D $N_p(\beta, H^{-1}(\hat{\beta}))$

Which method would you use to test $H_0 : \mathbf{C}\boldsymbol{\beta} = \mathbf{d}$ against $H_1 : \mathbf{C}\boldsymbol{\beta} \neq \mathbf{d}$

A t-test

B Deviance test

C Pearson test

D Wald test

In a Poisson rate model with log link we have index $t_i = 10$ and transformed linear predictor $\exp(\eta_i) = 5$. What is then $\mathrm{E}(Y_i)$?

A 0.5

B 2

C 15

D 50

What is the maximal number of satellites for a female crab in our data set?

A 5

B 10

C 15

D 20

Correct?

Are you sure you want to read the correct answers? Maybe try first? The answers are given on the next two slides.

Answers

1. B: Poisson canonical link is ln.
2. D: gamma canonical link is negative inverse.
3. No, this is not a good model. Deviance test is rejected.
4. A: Newton-Raphson with H

Answers

5. B: $N_p(\boldsymbol{\beta}, F^{-1}(\hat{\boldsymbol{\beta}}))$
6. D: Wald test
7. D: $t_i \exp(\eta_i) = \lambda_i$.
8. C: 15