Problem 1. Multiple Choice Questions: Generalized Linear Models

Instructions :

Throughout this exam, only your last submission will count.

(a)

1/1 point (graded)
Which of the following characteristics is/are true about the distribution of the **response variable** in a logistic regression model?

(Check all that apply.)

- [x] It is a Bernoulli distribution ✔
- [ ] It can be any distribution over the interval $(0, 1)$.
- [ ] It can be any distribution from the exponential family.
- [x] It is a distribution from the canonical exponential family. ✔

✔

Grading Note: Partial credit is given.

Solution:

A logistic regression model seeks to model the parameter of the Bernoulli distribution of the response variables given a set of parameters. As the Bernoulli distribution belongs to the canonical exponential family, the first and fourth choices are correct.

Submit You have used 2 of 3 attempts

ℹ Answers are displayed within the problem

(b)

1/1 point (graded)
In the **logistic regression** model, which of the following is a valid **canonical link function**? (Choose all that apply.)

- [x] the logit link function 两个都是对的
- [ ] the probit link function ✔

✖

Correction note: (May 25) In an earlier version of the problem statement, the first choice is “logistic function".

Grading note: Because of the wrong option in the earlier version, we will give credit to everyone is this problem. We apologize for the oversight.

Solution:

The canonical link function for the logistic regression model is the logit link function; however, the probit link function can still be used for a GLM modeling a Bernoulli response.

Submit You have used 2 of 3 attempts

Answers are displayed within the problem

(c)

1/1 point (graded)
In the logistic regression model, the maximum likelihood estimator is always unique.

- True ✔
- False ✔

Grading Note: Since we did not state if the rank of the design matrix is full or not, but we intended to emphasize that assuming rank is full, whenever one uses the canonical link function in the GLM, the MLE is always unique, we will accept both answers as correct.

Solution:

This is true as whenever one uses the canonical link function in the GLM, the associated optimization problem for the MLE estimate is convex; therefore, there is a unique optimum.

Submit You have used 1 of 3 attempts

Answers are displayed within the problem

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