Package 'fbglm'

May 8, 2026

Title Fractional Binomial Regression Model

Version 1.5.0

Description Fit a fractional binomial regression model and extended zero-inflated negative binomial regression model to count data with excess zeros using maximum likelihood estimation.
Compare zero-inflated regression models via Vuong closeness test.

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Imports bbmle, frbinom, pscl, agridat

Encoding UTF-8

RoxygenNote 7.3.2

Suggests knitr, rmarkdown

NeedsCompilation no

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Repository CRAN

Date/Publication 2024-10-25 08:00:02 UTC

Contents

`fbglm` *Fractional binomial regression model*

Description

Fit a fractional binomial regression model via maximum likelihood.

Usage

```
fbglm(y, x)
```

Arguments

y	A response vector.
x	A data frame with covariates.

Details

Fractional binomial distribution can be considered as zero-inflated, over-dispersed binomial model, and it has three parameters (p, H, c) in addition to the number of trials n. We use a specific parametrization such that $p, H, c \in (0, 1)$, and regress these parameters with logit link on the covariates, while letting n as the maximum of the response `y`.

Value

A list of log-likelihood, estimated coefficients, and maximum likelihood estimation results.

References

Breece, C. and Lee, J. (2024) Fractional binomial regression model for count data with excess zeros.https://arxiv.org/html/2410.08488v1

Examples

```
library(agridat)
library(bbmle)
sample<-sample(270, 30)
my_y<-ridout.appleshoots$roots[sample]
my_x<-data.frame(pho=ridout.appleshoots$pho[sample])
fbglm(y=my_y, x=my_x  )
```

test *Vuong closeness test for zero-inflated models*

Description

Compare zero-inflated regression models via Vuong closeness test.

Usage

```
test(y, x, model1, model2)
```

Arguments

y	A response vector.
x	A data frame with covariates.
model1	A character; one of "ZINB", "ZIP", "ZINB2", and "fbglm".
model2	A character; one of "ZINB", "ZIP", "ZINB2", and "fbglm".

Details

Perform one-tailed Vuong closeness test with the null hypothesis that the two models are equally close to the true data generating process, against the alternative that one model 1 is closer than model 2. Choose model1 and model2 from zero-inflated negative binomial regression ("ZINB"), extended zero-inflated negative binomial regression ("ZINB2"), zero-inflated Poisson regression ("ZIP"), and fractional binomial regression ("fbglm"). For "ZINB2" and "fbglm", see "fbglm::ZINB2" and "fbglm::fbglm" for details. In "ZIP" and "ZINB", all the covariates are used as regressors in both the count and zero-inflation component.

Value

One-sided p-value will be returned.

References

Vuong, Quang H. (1989). Likelihood Ratio Tests for Model Selection and non-nested Hypotheses. Econometrica. 57 (2): 307–333.

Examples

```
library(agridat)
library(bbmle)
sample<-sample(270, 30)
my_y<-ridout.appleshoots$roots[sample]
my_x<-data.frame(pho=ridout.appleshoots$pho[sample])
test( y=my_y, x=my_x , "fbglm", "ZINB2" )
```

ZINB2 *Extended zero-inflated negative binomial regression*

Description

Fit extended zero-inflated negative binomial regression model via maximum likelihood.

Usage

```
ZINB2(y, x)
```

Arguments

y	A response vector.
x	A data frame with covariates.

Details

The model regresses all the parameters– zero-inflation component π (with logit link), and both the mean μ and dispersion parameter θ (with log link)– on covariates.

Value

A list of log-likelihood, estimated coefficients, and maximum likelihood estimation results.

References

Breece, C. and Lee, J. (2024) Fractional binomial regression model for count data with excess zeros.https://arxiv.org/html/2410.08488v1

Examples

```
library(agridat)
library(bbmle)
sample<-sample(270, 30)
my_y<-ridout.appleshoots$roots[sample]
my_x<-data.frame(pho=ridout.appleshoots$pho[sample])
ZINB2(y=my_y, x=my_x  )
```

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