Package 'PScr'

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Type Package

Title Estimation for the Power Series Cure Rate Model

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Description Provide estimation for particular cases of the power series cure rate model <doi:10.1080/03610918.2011.639971>. For the distribution of the concurrent causes the alternative models are the Poisson, logarithmic, negative binomial and Bernoulli (which are includes in the original work), the polylogarithm model <doi:10.1080/00949655.2018.1451850> and the Flory-Schulz <doi:10.3390/math10244643>. The estimation procedure is based on the EM algorithm discussed in <doi:10.1080/03610918.2016.1202276>.
For the distribution of the time-to-event the alternative models are slash half-normal, Weibull, gamma and Birnbaum-Saunders distributions.

Depends R (>= 4.0.0), stats

Imports survival, pracma, VGAM

Suggests mstate

License GPL (>= 2)

NeedsCompilation no

Repository CRAN

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Contents

`EM.PScr` *Maximum likelihood estimation based on EM algorithm for the Power Series cure rate model*

Description

This function provides the maximum likelihood estimation based on the EM algorithm for the Power Series cure rate model

Usage

```
EM.PScr(t, delta, z, model = 1, dist = 1, max.iter = 1000,
          prec = 1e-04)
```

Arguments

`t`	observed times
`delta`	failure indicators
`z`	matrix of covariates (with n rows and r columns)
`model`	distribution to be used for the concurrent causes: 1 for Poisson, 2 for logarithmic, 3 for negative binomial, 4 for bernoulli and 5 for polylogarithm (Gallardo et al. 2018). 6 for Flory-Schulz (Azimi et al. 2022).
`dist`	distribution to be used for the time-to-event: 1 for slash half-normal (Gallardo et al., 2022), 2 for Weibull, 3 for gamma and 4 for Birnbaum-Saunders.
`max.iter`	maximum number of iterations to be used by the algorithm
`prec`	precision (in absolute value) for the parameters to stop the algorithm.

Details

The EM algorithm for the model is implemented as in Gallardo et al. (2017).

Value

`estimate`	a matrix containing the estimated parameters and their standard error
`loglike`	the estimated log-likelihood function evaluated in the maximum likelihood estimators
`AIC`	the Akaike information criterion
`BIC`	the Bayesian (also known as Schwarz) information criterion

Author(s)

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References

Azimi, R, Esmailian, M, Gallardo DI and Gomez HJ. (2022). A New Cure Rate Model Based on Flory-Schulz Distribution: Application to the Cancer Data. Mathematics 10, 4643

Gallardo DI, Gomez YM and De Castro M. (2018). A flexible cure rate model based on the poly-logarithm distribution. Journal of Statistical Computation and Simulation 88 (11), 2137-2149

Gallardo DI, Gomez YM, Gomez HJ, Gallardo-Nelson MJ, Bourguignon M. (2022) The slash half-normal distribution applied to a cure rate model with application to bone marrow transplantation. Mathematics, Submitted.

Gallardo DI, Romeo JS and Meyer R. (2017). A simplified estimation procedure based on the EM algorithm for the power series cure rate model. Communications in Statistics-Simulation and Computation 46 (8), 6342-6359.

Examples

```
require(mstate)
data(ebmt4)
attach(ebmt4)
t = srv / 365.25 # Time in years
delta=srv.s
prophy=as.factor(proph)
year2=ifelse(year=="1985-1989",0,1)
z=t(model.matrix(~proph-1))
#Computes the estimation for Poisson-Slash half-normal cure rate model
EM.PScr(t, delta, z, model=1, dist=1)
#Computes the estimation for Flory-Schulz-Slash half-normal cure rate model
EM.PScr(t, delta, z, model=6, dist=1)
```

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