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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R topics documented:

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 polylogarithm 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 halfnormal 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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