General Frailty Models: Shared, Joint and Nested Frailty Models with Prediction; Evaluation of Failure-Time Surrogate Endpoints

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Description:

The following several classes of frailty models using a penalized likelihood estimation on the hazard function but also a parametric estimation can be fit using this R package:

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1) A shared frailty model (with gamma or log-normal frailty distribution) and Cox proportional hazard mo
2) Additive frailty models for proportional hazard models with two correlated random effects (intercept
3) Nested frailty models for hierarchically clustered data (with 2 levels of clustering) by including tw
4) Joint frailty models in the context of the joint modelling for recurrent events with terminal event
5) Joint general frailty models in the context of the joint modelling for recurrent events with terminal
6) Joint Nested frailty models in the context of the joint modelling for recurrent events with terminal
7) Multivariate joint frailty models for two types of recurrent events and a terminal event.
8) Joint models for longitudinal data and a terminal event.
9) Trivariate joint models for longitudinal data, recurrent events and a terminal event.
10) Joint frailty models for the validation of surrogate endpoints in multiple randomized clinical trial
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Prediction values are available (for a terminal event or for a new recurrent event). Left-truncated (not for Joint model), right-censored data, interval-censored data (only for Cox proportional hazard and shared frailty model) and strata are allowed. In each model, the random effects have the gamma or normal distribution. Now, you can also consider time-varying covariates effects in Cox, shared and joint frailty models (1-5). The package includes concordance measures for Cox proportional hazards models and for shared frailty models.

Installation

The R package frailtypack is available on cran at https://cran.r-project.org/web/packages/frailtypack/index.html

You can install frailtypack from github with:

```r
# install.packages("frailtypack")
devtools::install_github("socale/frailtypack")
```

Example

This is a basic example which shows you how use frailtypack in the context of the validation of a candidate surrogate endpoint. We use genarated data.

```r
## Data Generation
data.sim <- jointSurrSimul(n.obs=600, n.trial = 30,cens.adm=549.24,
    alpha = 1.5, theta = 3.5, gamma = 2.5, zeta = 1, sigma.s = 0.7,
```

```
    sigma.t = 0.7, rsqrt = 0.8, betas = -1.25, betat = -1.25, full.data = 0,
    random.generator = 1, seed = 0, nb.reject.data = 0)

# Estimation
joint.surro.sim.MCGH <- jointSurroPenal(data = data.sim, int.method = 2,
    nb.mc = 300, nb.gh = 20)

# Result
summary(joint.surro.sim.MCGH)
```