Package 'pair.mglmm'

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Type Package

Title Pairwise fitting for Multivariate GLMM

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Description Pairwise fitting for Multivariate GLMM

License GPL

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`pair.mglmm-package` *Pairwise fitting for multivariate GLMM*

Description

Pairwise fitting for multivariate GLMM

Details

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Type:	Package
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Date:	2012-11-21
License:	GPL

Author(s)

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`cll` *Conditional log-likelihood*

Description

Conditional log-likelihood of a Compound Poisson mixed model. Used to find the modes of random effects. Internal usage.

Usage

```
cll(u, r, beta, S, phi, p)
```

Arguments

`u`	Random effects vector.
`r`	List containing a response vector and design matrices for fixed and random effects.
`beta`	Estimated fixed effects vector.
`S`	Estimated variance components matrix.
`phi`	Estimated dispersion parameter.
`p`	Estimated compound Poisson index parameter.

Details

Returns a scalar correspondent to the conditional log-likelihood of the compound Poisson model.

`data.sim` *data.sim*

Description

Simulation of multivariate data.

Usage

```
data.sim(m, distr, link.inv, beta = NULL, ...)
```

Arguments

`m`	Dimension of the multivariate response.
`distr`	Distribution of the conditional response. Supported distributions include 'poisson', 'binomial', 'gaussian' and 'CP' (compound Poisson)
`link.inv`	Inverse link function.
`beta`	Matrix of fixed effects parameters of dimension 4 x m. If not supplied, the parameters are randomly generated from an uniform distribuition in (-2,2).
`...`	Additional parameters for the respective distribution.

Details

The generated data frame contains the variables 'ID', 'Period', 'variable' and 'value'. The data is generated assuming ...

Value

`Data`	Simulated data
`beta`	Fixed effects parameters
`S`	Variance-covariance matrix for the multivariate random effects

Author(s)

Rubem Ceratti

Examples

```
beta.c1<-c(0.70,1.45,1.65,1.90)
beta.c2<-c(0.96,1.39,0.40,1.19)
beta.c3<-c(1.25,1.86,0.19,-0.39)
beta<-matrix(c(beta.c1,beta.c2,beta.c3),4,3)

mydat<-data.sim(3,'poisson',exp,beta)
dat<-mydat$Data

head(dat)
str(dat)
dim(dat)
```

f0.ep *Frames list*

Description

Given a data frame and a lme4 like formula, the function returns the response vector and design matrices for fixed and random effects. Internal usage.

Usage

```
f0.ep(data, formula)
```

Arguments

data	A data frame.
formula	An lme4 like formula.

fit.mglmm *fit.mglmm*

Description

Fitted values from a multivariate compound Poisson mixed model. Internal usage. See fitted.cp.

Usage

```
fit.mglmm(mod, fixef, ranef)
```

Arguments

mod	'mer' object.
fixef	Estimated fixed effects vector.
ranef	Random effects vector.

fitted.cp *fitted.cp*

Description

Fitted values from a multivariate compound Poisson mixed model.

Usage

```
fitted.cp(mod)
```

Arguments

mod	Fitted multivariate compound Poisson model.

Details

Returns the fitted values of the model.

`format0CP` *format0CP*

Description

Organazing the fixed effects vectors from the fitted pairwise models. Internal usage.

Usage

```
format0CP(mod)
```

Arguments

`mod`	Fitted 'mer' object.

`format1CP` *format1CP*

Description

List with the averaged estimates for the fixed effects, variace components matrix, dispersion parameter and index parameter. Internal usage.

Usage

```
format1CP(df.m, formula, data)
```

Arguments

`df.m`	Data frame with averaged estimates.
`formula`	lme4 like formula.
`data`	Data.

glmmMultiCP *glmmMultiCP*

Description

Workhorse function – fits all pairwise models. Internal usage.

Usage

```
glmmMultiCP(formula, id, data, cl = NULL)
```

Arguments

formula	lme4 like formula.
id	Factor that identifies the multivariate responses.
data	Data.
cl	Cluster to be used.

llik.fim *llik.fim*

Description

Monte Carlo approxmation to the log-likelihood. Internal usage.

Usage

```
llik.fim(mod, formula, beta, S, phi, p, B = 10000, cl = NULL)
```

Arguments

mod	'mer' object.
formula	Formula.
beta	Estimated fixed effects vector.
S	Estimated variance components matrix.
phi	Estimated dispersion parameter.
p	Estimated compound Poisson index.
B	Number of simulated samples from the multivariate normal distribution.
cl	Cluster to be used.

`logLik.cp` *logLik.cp*

Description

Log-likelihood function and degrees of freedom of the fitted multivariate compound Poisson model.

Usage

```
logLik.cp(mod)
```

Arguments

`mod`	Fitted multivariate compound Poisson model.

Value

`logLik`	Log-likelihood value
`df`	Degrees of freedom

`mglmmCP` *mglmmCP*

Description

Function that fits multivariate compound Poisson models using the pairwise approach outlined in Fieuws et. al (2006).

Usage

```
mglmmCP(formula, id, data, cl = NULL)
```

Arguments

`formula`	Multivariate formula.
`id`	Factor that identifies the multivariate responses.
`data`	Multivariate data as generated by data.sim().
`cl`	Cluster to be used.

Value

`fixef`	Estimated fixed effects.
`VarCov`	Estimated variance components matrix.
`phi`	Estimated dispersion parameter.
`p`	Estimated index parameter of the copmpound Poisson distribution.
`logLik`	Log-likelihood of the model.
`df`	Degrees of freedom of the model.
`ranef`	Matrix of random effects.
`fitted`	Fitted values.
`residuals`	Pearson like residuals.

References

Fieuws, S.; Verbeke, G.; Boen, F; Delecluse, C. High dimensional multivariate mixed models for binary questionnaire data. Applied Statistics 55(4) (2006). 449-460.

Examples

```
library(pair.mglmm)
library(powell)


# Simulated data
phi <- 1; p <- 1.6

mydat <- data.sim(3, 'CP', exp, xi=p, phi=phi)
dat <- mydat$Data

mainForm0 <- value~-1+variable:period+(-1+variable|ID)
mainForm1 <- value~-1+variable+(-1+variable|ID)


# Pairwise models
cl<-makeCluster(4)
registerDoParallel(cl)
clusterEvalQ(cl, library(pair.mglmm))

system.time(m0.1 <- mglmmCP(mainForm0, dat$variable, dat))
system.time(m1.1 <- mglmmCP(mainForm1, dat$variable, dat))

stopCluster(cl)


# Multivariate models
system.time(m0 <- cpglmm(mainForm0, data=dat))
system.time(m1 <- cpglmm(mainForm1, data=dat))



# Log-likelihood ratio
logLik(m0)-logLik(m1)
m0.1$logLik-m1.1$logLik


# Random effects
m0.1$ranef
ranef(m0)

m1.1$ranef
ranef(m1)


# Fitted values
fit0.1 <- m0.1$fitted
fit0 <- fitted(m0)
cbind(fit0, fit0.1)

fit1.1 <- m1.1$fitted
```

```
fit1 <- fitted(m1)
cbind(fit1, fit1.1)


# Model comparison
m0
summary.cp(m0.1)

m1
summary.cp(m1.1)
```

---

ranef.cp *ranef.cp*

Description

Random effects of a multivariate compound Poisson model.

Usage

```
ranef.cp(mod)
```

Arguments

mod	Fitted multivariate compound Poisson model.

---

rcov *rcov*

Description

Standard errors of the fixed effects vector. Internal usage.

Usage

```
rcov(mod, formula, S, phi, p, fit)
```

Arguments

mod	'mer' object.
formula	lme4 like formula.
S	Estimated variance components matrix.
phi	Estimated dispersion parameter.
p	Estimated index parameter.
fit	Fitted values.

re.mglmm *re.mglmm*

Description

Random effects of the multivariate compound Poisson model. Internal usage. See resid.cp.

Usage

```
re.mglmm(mod, formula, beta, S, phi, p)
```

Arguments

mod	'mer' object.
formula	lme4 like formula.
beta	Estimated fixed effects vector.
S	Estimated variance components matrix.
phi	Estimated dispersion parameter.
p	Estimated compound Poisson index parameter.

resid.cp *resid.cp*

Description

Residuals of the multivariate compound Poisson model.

Usage

```
resid.cp(mod)
```

Arguments

mod	Fitted multivariate compound Poisson model.

Details

Pearson like residuals, analogous to those provided by lme4 and cplm.

resid.mglmm *resid.mglmm*

Description

Residuals of the multivariate compound Poisson model. Internal usage. See fitted.cp.

Usage

```
resid.mglmm(mod, fit, p)
```

Arguments

mod	'mer' object.
fit	Fitted values.
p	Estimated index parameter.

summary.cp *summary.cp*

Description

Summary function for the fitted multivariate compound Poisson model.

Usage

```
summary.cp(mod)
```

Arguments

mod	Fitted multivariate compound Poisson model.

Value

fixef	Estimated fixed effects.
VarCov	Estimated variance components matrix.
phi	Estimated dispersion parameter.
p	Estimated index parameter of the copmpound Poisson distribution.
logLik	Log-likelihood of the model.
df	Degrees of freedom of the model.

uhat *uhat*

Description

Condictional modes of the random effects. Internal usage.

Usage

```
uhat(r, beta, S, phi, p)
```

Arguments

r	See cll.
beta	See cll.
S	See cll.
phi	See cll.
p	See cll.

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