Package 'merDeriv'

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Title Case-Wise and Cluster-Wise Derivatives for Mixed Effects Models

Version 0.1-1

Description Compute analytic case-wise and cluster-wise derivative for
mixed effects models with respect to fixed effects parameter, random effect (co)variances,
and residual variance.

Depends R (>= 3.2.3)

Imports methods, stats, utils, sandwich, Matrix, lme4, nonnest2

License GPL (>= 2)

LazyData yes

URL <http://semtools.r-forge.r-project.org>

NeedsCompilation no

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Repository CRAN

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R topics documented:

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bread.lmerMod   *Extract Bread Component for Huber-White Sandwich Estimator of*
                             Linear Mixed Effects Models

Description

This function calculates the bread component of Huber-White sandwich estimator (variance covariance matrix multiply the number of clusters) for a linear mixed effects model, of class lmerMod.

Usage

```
   ## S3 method for class 'lmerMod'
bread(object, full = TRUE, ...)
```

Arguments

object   An object of class lmerMod.

full   If full = TRUE (the default), the bread component of Huber-White sandwich
                estimator for all fitted parameters, including fixed effect parameters, random
                effect (co)variances, and residual variance are returned. If full = FALSE, the
                bread component for only fixed effect parameters are returned.

...   additional arguments.

Value

A *p* by *p* "bread" matrix for the Huber-White sandwich estimator (variance-covariance matrix multiplied by the number of clusters), where *p* represents the number of parameters.

References

Wang, T. & Merkle, E. C. (2016). Derivative Computations and Robust Standard Errors for Linear Mixed Effects Models in lme4. https://arxiv.org/abs/1612.04911

Zeileis, A. (2006). Object-Oriented Computation of Sandwich Estimators. Journal of Statistical Software, **16**(9), 1-16. http://www.jstatsoft.org/v16/i09/

Examples

```
   ## Not run:
     # The sleepstudy example
     lme4fit <- lmer(Reaction ~ Days + (Days|Subject), sleepstudy, REML = FALSE)

     # bread component for all parameters
     bread(lme4fit)

## End(Not run)
```

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estfun.lmerMod | *Extract Case-wise and Cluster-wise Derivatives for Linear Mixed Effects Models*

Description

A function for extracting the case-wise and cluster-wise derivatives of a linear mixed effects models fitted via **lme4**. This function returns the case-wise and cluster-wise scores, evaluated at the ML estimates.

Usage

```
   ## S3 method for class 'lmerMod'
estfun(object, level = 2, ...)
```

Arguments

object	An object of class `lmerMod`.
level	If `level = 1`, case-wise scores are returned. If `level = 2` (the default), cluster-wise scores are returned.
...	additional arguments.

Value

An *n* by *p* score matrix, corresponding to *n* observations and *p* parameters.

References

Wang, T. & Merkle, E. C. (2016). Derivative Computations and Robust Standard Errors for Linear Mixed Effects Models in lme4. https://arxiv.org/abs/1612.04911

Examples

```
   ## Not run:
     # The sleepstudy example
     lme4fit <- lmer(Reaction ~ Days + (Days|Subject), sleepstudy, REML = FALSE)

     # casewise scores
     estfun(lme4fit, level = 1)

     # clusterwise scores
     estfun(lme4fit, level = 2)

## End(Not run)
```

---

llcont.lmerMod   *Extract Case-wise Log Likelihoods for Linear Mixed Effects Models*

Description

A function for extracting the case-wise log likelihoods of a linear mixed effects model fitted via
lme4. This function returns the case-wise log likelihoods, evaluated at the ML estimates.

Usage

```
  ## S3 method for class 'lmerMod'
llcont(object, ...)
```

Arguments

object   An object of class `lmerMod`.

...   additional arguments.

Value

A vector of length *n*, containing log-likelihoods for the *n* observations.

References

Wang, T. & Merkle, E. C. (2016). Derivative Computations and Robust Standard Errors for Linear
Mixed Effects Models in lme4. https://arxiv.org/abs/1612.04911

Merkle, E. C., You, D. and Preacher, K. J., 2016. Testing Nonnested Structural Equation Models.
Psychological Methods, **21**(2), 151. https://arxiv.org/pdf/1402.6720v3

Examples

```
  ## Not run:
    # The sleepstudy example
    lme4fit <- lmer(Reaction ~ Days + (Days|Subject), sleepstudy, REML = FALSE)

    # casewise log likelihood
    llcont(lme4fit)

## End(Not run)
```

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vcov.lmerMod	*Extract Variance-Covariance Matrix of all Parameters for Linear Mixed Effects Models*

Description

This function calculates the variance-covariance matrix for all parameters (fixed, random effect, and residual) in a linear mixed effects model of class lmerMod.

Usage

```
  ## S3 method for class 'lmerMod'
vcov(object, full = TRUE, ...)
```

Arguments

object	An object of class lmerMod.
full	If full = TRUE (default), the variance-covariance matrix for all fitted parameters (including fixed effect parameters, random effect (co)variances, and residual variance. If full = FALSE, the variance-covariance matrix of only fixed effect parameters is returned.
...	additional arguments.

Value

A *p* by *p* variance-covariance matrix, where *p* represents the number of parameters.

References

Wang, T. & Merkle, E. C. (2016). Derivative Computations and Robust Standard Errors for Linear Mixed Effects Models in lme4. https://arxiv.org/abs/1612.04911

Examples

```
  ## Not run:
    # The sleepstudy example
    lme4fit <- lmer(Reaction ~ Days + (Days|Subject), sleepstudy, REML = FALSE)

    # variance covariance matrix for all parameters
    vcov(lme4fit)

## End(Not run)
```

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