

# Package ‘glme’

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**Type** Package

**Title** Generalized Linear Mixed Effects Models

**Version** 0.1.0

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**Description** Provides Generalized Inferences based on exact distributions and exact probability statements for mixed effect models, provided by such papers as Weerahandi and Yu (2020) <doi:10.1186/s40488-020-00105-w> under the widely used Compound Symmetric Covariance structure. The package returns the estimation of the coefficients in random and fixed part of the mixed models by generalized inference.

**License** GPL (>= 2)

**Encoding** UTF-8

**LazyData** true

**Imports** nlme, reshape, dplyr, stats

**NeedsCompilation** no

**Repository** CRAN

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glme

*Generalized Linear Mixed Effects Models***Description**

This function fits a linear mixed effect model with generalized inference.

**Usage**

```
glme(fixed, data, random, correlation, weights, subset,
     method, na.action, control, contrasts, keep.data)
```

**Arguments**

|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| fixed       | a linear model formula, with the response on the left of an operator and an expression involving parameters and covariates on the right.                                                                                                                                                                                                                                                                                                                                                                            |
| data        | an optional data frame containing the variables named in model, fixed, random, correlation, weights, subset, and naPattern. By default the variables are taken from the environment from which glme is called.                                                                                                                                                                                                                                                                                                      |
| random      | a two-sided linear formula of the form $f_1 + \dots + f_n \sim x_1 + \dots + x_m$ , or a list of two-sided formulas of the form $f_1 \sim x_1 + \dots + x_m$ , with possibly different models for different parameters. The $f_1, \dots, f_n$ are the names of parameters included on the right hand side of model and the $x_1 + \dots + x_m$ expressions define linear models for these parameters. On the right hand side of the formula(s) indicates a single fixed effects for the corresponding parameter(s). |
| correlation | an optional corStruct object describing the within-group correlation structure                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| weights     | an optional varFunc object or one-sided formula describing the within-group heteroscedasticity structure.                                                                                                                                                                                                                                                                                                                                                                                                           |
| subset      | an optional expression indicating the subset of the rows of data that should be used in the fit. This can be a logical vector, or a numeric vector indicating which observation numbers are to be included, or a character vector of the row names to be included. All observations are included by default.                                                                                                                                                                                                        |
| method      | a character string. If "GM" the model is fit by generalized inference. If "REML" the model is fit by maximizing the restricted log-likelihood. If "ML" the log-likelihood is maximized. Defaults to "GM".                                                                                                                                                                                                                                                                                                           |
| na.action   | a function that indicates what should happen when the data contain NAs.                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| control     | a list of control values for the estimation algorithm to replace the default values returned.                                                                                                                                                                                                                                                                                                                                                                                                                       |
| contrasts   | an optional list. See the contrasts.arg of model.matrix.default.                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| keep.data   | logical: should the data argument (if supplied and a data frame) be saved as part of the model object.                                                                                                                                                                                                                                                                                                                                                                                                              |

**Value**

|              |                                                                                      |
|--------------|--------------------------------------------------------------------------------------|
| fixed        | returns the coefficient estimations and model summary of the fixed part.             |
| sd           | returns the standard deviation of random effects.                                    |
| coefficients | returns the coefficient estimations of the fixed and random part of the mixed model. |

**Author(s)**

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**References**

Yu, C.R., Kelly H.Z., Carlsson, M.O., and Weerahandi, S. (2015) Generalized Estimation of the BLUP in Mixed-Effects Models: A Comparison with ML and REML, *Communications in Statistics - Simulation and Computation*, 44:3, 694-704, <https://doi.org/10.1080/03610918.2013.790445>

Weerahandi, S. and Yu, CR. (2020) Exact distributions of statistics for making inferences on mixed models under the default covariance structure. *Journal of Statistical Distributions and Applications*, 7:4, <https://doi.org/10.1186/s40488-020-00105-w>

Gamage, J., Mathew, T., and Weerahandi, S. (2013) Generalized prediction intervals for BLUPs in mixed models, *Journal of Multivariate Analysis*, 120, 226 - 233, <https://doi.org/10.1016/j.jmva.2013.05.011>.

**Examples**

```
library(nlme)
library(glme)
glme(distance ~ age + Sex, data = Orthodont, random = ~ age|Subject, method = "GM")
```

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