Package 'rxode2ll'

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Version 2.0.12

Title Log-Likelihood Functions for 'rxode2'

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Depends R (>= 4.0.0)

Suggests covr, testthat (>= 3.0.0)

Imports Rcpp (>= 1.0.8), checkmate, RcppParallel

Description Provides the log-likelihoods with gradients from 'stan'
(Carpenter et al (2015), <doi:10.48550/arXiv.1509.07164>) needed
for generalized log-likelihood estimation in 'nlmixr2'
(Fidler et al (2019) <doi:10.1002/psp4.12445>). This is
split of to reduce computational burden of recompiling 'rxode2'
(Wang, Hallow and James (2016) <doi:10.1002/psp4.12052>) which runs
the 'nlmixr2' models during estimation.

BugReports https://github.com/nlmixr2/rxode2ll/issues/

NeedsCompilation yes

License GPL (>= 3)

URL https://nlmixr2.github.io/rxode2ll/,
https://github.com/nlmixr2/rxode2ll/

RoxygenNote 7.2.3

Biarch true

LinkingTo Rcpp (>= 1.0.8), RcppEigen (>= 0.3.3.9.2), StanHeaders (>=
2.21.0.7), BH (>= 1.78.0.0), RcppParallel

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Contents

`llikBeta` *Calculate the log likelihood of the binomial function (and its derivatives)*

Description

Calculate the log likelihood of the binomial function (and its derivatives)

Usage

```
llikBeta(x, shape1, shape2, full = FALSE)
```

Arguments

`x`	Observation
`shape1`, `shape2`	non-negative parameters of the Beta distribution.
`full`	Add the data frame showing x, mean, sd as well as the fx and derivatives

Value

data frame with `fx` for the log pdf value of with `dShape1` and `dShape2` that has the derivatives with respect to the parameters at the observation time-point

Author(s)

Matthew L. Fidler

Examples

```
x <- seq(1e-4, 1 - 1e-4, length.out = 21)

llikBeta(x, 0.5, 0.5)

llikBeta(x, 1, 3, TRUE)
```

`llikBinom` *Calculate the log likelihood of the binomial function (and its derivatives)*

Description

Calculate the log likelihood of the binomial function (and its derivatives)

Usage

```
llikBinom(x, size, prob, full = FALSE)
```

Arguments

`x`	Number of successes
`size`	Size of trial
`prob`	probability of success
`full`	Add the data frame showing x, mean, sd as well as the fx and derivatives

Value

data frame with `fx` for the pdf value of with `dProb` that has the derivatives with respect to the parameters at the observation time-point

Author(s)

Matthew L. Fidler

Examples

```
llikBinom(46:54, 100, 0.5)

llikBinom(46:54, 100, 0.5, TRUE)
```

llikCauchy *log likelihood of Cauchy distribution and it's derivatives (from stan)*

Description

log likelihood of Cauchy distribution and it's derivatives (from stan)

Usage

```
llikCauchy(x, location = 0, scale = 1, full = FALSE)
```

Arguments

x	Observation
location, scale	location and scale parameters.
full	Add the data frame showing x, mean, sd as well as the fx and derivatives

Value

data frame with fx for the log pdf value of with dLocation and dScale that has the derivatives with respect to the parameters at the observation time-point

Author(s)

Matthew L. Fidler

Examples

```
x <- seq(-3, 3, length.out = 21)

llikCauchy(x, 0, 1)

llikCauchy(x, 3, 1, full=TRUE)
```

llikChisq *log likelihood and derivatives for chi-squared distribution*

Description

log likelihood and derivatives for chi-squared distribution

Usage

```
llikChisq(x, df, full = FALSE)
```

Arguments

x	variable that is distributed by chi-squared distribution
df	degrees of freedom (non-negative, but can be non-integer).
full	Add the data frame showing x, mean, sd as well as the fx and derivatives

Value

data frame with fx for the log pdf value of with dDf that has the derivatives with respect to the df parameter the observation time-point

Author(s)

Matthew L. Fidler

Examples

```
llikChisq(1, df = 1:3, full=TRUE)

llikChisq(1, df = 6:9)
```

---

llikExp *log likelihood and derivatives for exponential distribution*

Description

log likelihood and derivatives for exponential distribution

Usage

```
llikExp(x, rate, full = FALSE)
```

Arguments

x	variable that is distributed by exponential distribution
rate	vector of rates.
full	Add the data frame showing x, mean, sd as well as the fx and derivatives

Value

data frame with fx for the log pdf value of with dRate that has the derivatives with respect to the rate parameter the observation time-point

Author(s)

Matthew L. Fidler

Examples

```
llikExp(1, 1:3)

llikExp(1, 1:3, full=TRUE)
```

`llikF` *log likelihood and derivatives for F distribution*

Description

log likelihood and derivatives for F distribution

Usage

```
llikF(x, df1, df2, full = FALSE)
```

Arguments

`x`	variable that is distributed by f distribution
`df1`, `df2`	degrees of freedom. `Inf` is allowed.
`full`	Add the data frame showing x, mean, sd as well as the fx and derivatives

Value

data frame with `fx` for the log pdf value of with `dDf1` and `dDf2` that has the derivatives with respect to the `df1`/`df2` parameters at the observation time-point

Author(s)

Matthew L. Fidler

Examples

```
x <- seq(0.001, 5, length.out = 100)

llikF(x^2, 1, 5)
```

llikGamma *log likelihood and derivatives for Gamma distribution*

Description

log likelihood and derivatives for Gamma distribution

Usage

```
llikGamma(x, shape, rate, full = FALSE)
```

Arguments

x	variable that is distributed by gamma distribution
shape	this is the distribution's shape parameter. Must be positive.
rate	this is the distribution's rate parameters. Must be positive.
full	Add the data frame showing x, mean, sd as well as the fx and derivatives

Value

data frame with `fx` for the log pdf value of with `dProb` that has the derivatives with respect to the `prob` parameters at the observation time-point

Author(s)

Matthew L. Fidler

Examples

```
llikGamma(1, 1, 10)
```

llikGeom *log likelihood and derivatives for Geom distribution*

Description

log likelihood and derivatives for Geom distribution

Usage

```
llikGeom(x, prob, full = FALSE)
```

Arguments

x	variable distributed by a geom distribution
prob	probability of success in each trial. 0 < prob <= 1.
full	Add the data frame showing x, mean, sd as well as the fx and derivatives

Value

data frame with fx for the log pdf value of with dProb that has the derivatives with respect to the prob parameters at the observation time-point

Author(s)

Matthew L. Fidler

Examples

```
llikGeom(1:10, 0.2)
```

---

llikNbinom *Calculate the log likelihood of the negative binomial function (and its derivatives)*

Description

Calculate the log likelihood of the negative binomial function (and its derivatives)

Usage

```
llikNbinom(x, size, prob, full = FALSE)
```

Arguments

x	Number of successes
size	Size of trial
prob	probability of success
full	Add the data frame showing x, mean, sd as well as the fx and derivatives

Value

data frame with fx for the pdf value of with dProb that has the derivatives with respect to the parameters at the observation time-point

Author(s)

Matthew L. Fidler

Examples

```
llikNbinom(46:54, 100, 0.5)

llikNbinom(46:54, 100, 0.5, TRUE)
```

`llikNbinomMu` *Calculate the log likelihood of the negative binomial function (and its derivatives)*

Description

Calculate the log likelihood of the negative binomial function (and its derivatives)

Usage

```
llikNbinomMu(x, size, mu, full = FALSE)
```

Arguments

`x`	Number of successes
`size`	Size of trial
`mu`	mu parameter for negative binomial
`full`	Add the data frame showing x, mean, sd as well as the fx and derivatives

Value

data frame with `fx` for the pdf value of with `dProb` that has the derivatives with respect to the parameters at the observation time-point

Author(s)

Matthew L. Fidler

Examples

```
llikNbinomMu(46:54, 100, 40)

llikNbinomMu(46:54, 100, 40, TRUE)
```

llikNorm *Log likelihood for normal distribution*

Description

Log likelihood for normal distribution

Usage

```
llikNorm(x, mean = 0, sd = 1, full = FALSE)
```

Arguments

x	Observation
mean	Mean for the likelihood
sd	Standard deviation for the likelihood
full	Add the data frame showing x, mean, sd as well as the fx and derivatives

Value

data frame with fx for the pdf value of with dMean and dSd that has the derivatives with respect to the parameters at the observation time-point

Author(s)

Matthew L. Fidler

Examples

```
llikNorm(0)

llikNorm(seq(-2,2,length.out=10), full=TRUE)
```

llikPois *log-likelihood for the Poisson distribution*

Description

log-likelihood for the Poisson distribution

Usage

```
llikPois(x, lambda, full = FALSE)
```

Arguments

x	non negative integers
lambda	non-negative means
full	Add the data frame showing x, mean, sd as well as the fx and derivatives

Value

data frame with fx for the pdf value of with dLambda that has the derivatives with respect to the parameters at the observation time-point

Author(s)

Matthew L. Fidler

---

llikT *Log likelihood of T and it's derivatives (from stan)*

Description

Log likelihood of T and it's derivatives (from stan)

Usage

```
llikT(x, df, mean = 0, sd = 1, full = FALSE)
```

Arguments

x	Observation
df	degrees of freedom (> 0, maybe non-integer). df = Inf is allowed.
mean	Mean for the likelihood
sd	Standard deviation for the likelihood
full	Add the data frame showing x, mean, sd as well as the fx and derivatives

Value

data frame with fx for the log pdf value of with dDf dMean and dSd that has the derivatives with respect to the parameters at the observation time-point

Author(s)

Matthew L. Fidler

Examples

```
x <- seq(-3, 3, length.out = 21)

llikT(x, 7, 0, 1)

llikT(x, 15, 0, 1, full=TRUE)
```

`llikUnif` *log likelihood and derivatives for Unif distribution*

Description

log likelihood and derivatives for Unif distribution

Usage

```
llikUnif(x, alpha, beta, full = FALSE)
```

Arguments

`x`	variable distributed by a uniform distribution
`alpha`	is the lower limit of the uniform distribution
`beta`	is the upper limit of the distribution
`full`	Add the data frame showing x, mean, sd as well as the fx and derivatives

Value

data frame with `fx` for the log pdf value of with `dProb` that has the derivatives with respect to the `prob` parameters at the observation time-point

Author(s)

Matthew L. Fidler

Examples

```
llikUnif(1, -2, 2)
```

`llikWeibull` *log likelihood and derivatives for Weibull distribution*

Description

log likelihood and derivatives for Weibull distribution

Usage

```
llikWeibull(x, shape, scale, full = FALSE)
```

Arguments

`x`	variable distributed by a Weibull distribution
`shape`, `scale`	shape and scale parameters, the latter defaulting to 1.
`full`	Add the data frame showing x, mean, sd as well as the fx and derivatives

Value

data frame with `fx` for the log pdf value of with `dProb` that has the derivatives with respect to the `prob` parameters at the observation time-point

Author(s)

Matthew L. Fidler

Examples

```
llikWeibull(1, 1, 10)
```

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