Package 'ECctmc'

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Type Package

Title Simulation from Endpoint-Conditioned Continuous Time Markov Chains

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URL https://github.com/fintzij/ECctmc

BugReports https://github.com/fintzij/ECctmc/issues

Description Draw sample paths for endpoint-conditioned continuous time Markov chains via modified rejection sampling or uniformization.

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LazyData TRUE

Imports Rcpp (>= 0.12.16)

LinkingTo Rcpp, RcppArmadillo

RoxygenNote 6.0.1

Suggests knitr, rmarkdown, testthat

VignetteBuilder knitr

NeedsCompilation yes

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Repository CRAN

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R topics documented:

`comp_expmat` *Compute the matrix exponential.*

Description

Compute the matrix exponential.

Usage

```
comp_expmat(Q)
```

Arguments

`Q`	matrix

Value

Matrix exponential of Q

`sample_path` *Sample path from the distribution of an endpoint-conditioned CTMC.*

Description

Sample path from the distribution of an endpoint-conditioned CTMC.

Usage

```
sample_path(a, b, t0, t1, Q, method = "mr", npaths = 1, eigen_vals = NULL,
  eigen_vecs = NULL, inverse_vecs = NULL, P = NULL)
```

Arguments

`a, b`	States at the left and right endpoints of the interval, given as row numbers of the CTMC rate matrix
`t0, t1`	Times for the left and right endpoints of the interval.
`Q`	CTMC rate matrix.
`method`	Either "mr" corresponding to modified rejection sampling, or "unif" for uniformization.
`npaths`	optional argument for the number of sample paths to simulate.
`eigen_vals`	optional vector of eigen values of Q (assumes all eigen values are real).
`eigen_vecs`	optional matrix of eigen vectors of Q.
`inverse_vecs`	optional inverse of the eigen vector matrix.
`P`	optional transition probability matrix over the interval

Value

sample_path returns either a matrix with a sample path or a list of matrices of sample paths.

Examples

```
sample_path(1, 2, 0, 5, matrix(c(-0.49, 0.49, 0.51, -0.51), nrow = 2, byrow = TRUE))
```

`sample_path_mr` *Simulate a sample path from an endpoint conditioned CTMC by modified rejection sampling.*

Description

Simulate a sample path from an endpoint conditioned CTMC by modified rejection sampling.

Usage

```
sample_path_mr(a, b, t0, t1, Q)
```

Arguments

`a, b`	States at the interval endpoints, provided as integers corresponding to rows of the CTMC rate matrix.
`t0, t1`	times of the interval endpoints
`Q`	CTMC rate matrix

Value

matrix whose first column is the sequence of transition times bookended by interval endpoints, and whose second column is the sequence of states

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`sample_path_unif` *Simulate a sample path from an endpoint conditioned CTMC by uniformization.*

Description

Simulate a sample path from an endpoint conditioned CTMC by uniformization.

Usage

```
sample_path_unif(a, b, t0, t1, Q)
```

Arguments

a, b	States at the interval endpoints, provided as integers corresponding to rows of the CTMC rate matrix.
t0, t1	times of the interval endpoints
Q	CTMC rate matrix

Value

matrix whose first column is the sequence of transition times bookended by interval endpoints, and whose second column is the sequence of states

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sample_path_unif2 *Simulate a sample path from an endpoint conditioned CTMC by uniformization using pre-computed eigen-values (assumes that all eigenvalues are real).*

Description

Simulate a sample path from an endpoint conditioned CTMC by uniformization using pre-computed eigen-values (assumes that all eigenvalues are real).

Usage

```
sample_path_unif2(a, b, t0, t1, Q, eigen_vals, eigen_vecs, inverse_vecs)
```

Arguments

a, b	States at the interval endpoints, provided as integers corresponding to rows of the CTMC rate matrix.
t0, t1	times of the interval endpoints
Q	CTMC rate matrix
eigen_vals	vector of eigen values of Q.
eigen_vecs	matrix of eigen vectors of Q.
inverse_vecs	inverse of the eigen vector matrix.

Value

matrix whose first column is the sequence of transition times bookended by interval endpoints, and whose second column is the sequence of states

`sample_path_unif3` *Simulate a sample path from an endpoint conditioned CTMC by uniformization using a pre-computed transition probability matrix.*

Description

Simulate a sample path from an endpoint conditioned CTMC by uniformization using a pre-computed transition probability matrix.

Usage

```
sample_path_unif3(a, b, t0, t1, Q, P)
```

Arguments

`a, b`	States at the interval endpoints, provided as integers corresponding to rows of the CTMC rate matrix.
`t0, t1`	times of the interval endpoints
`Q`	CTMC rate matrix
`P`	CTMC transition probability matrix over the interval.

Value

matrix whose first column is the sequence of transition times bookended by interval endpoints, and whose second column is the sequence of states

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