Package 'mmppr'

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Title Markov Modulated Poisson Process for Unsupervised Event Detection in Time Series of Counts

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Depends R (>= 3.0.2), expm, reshape2, stats, methods

Description Time-series of count data occur in many different contexts. A Markov-modulated Poisson process provides a framework for detecting anomalous events using an unsupervised learning approach.

License GPL (>= 2)

LazyData true

RoxygenNote 5.0.1

NeedsCompilation no

Repository CRAN

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R topics documented:

`:=` *:=*

Description

This function allows multiple assignments

Usage

```
":="(lhs, rhs)
```

Arguments

`lhs`	The value to be assigned to the left-hand argument (on the left)
`rhs`	The value to be assigned to the right-hand argument (on the left)

Examples

```
c(a, b):=c(3, 4)
```

`dirichlet.log.pdf` *dirichlet.log.pdf*

Description

The log of the probability density function for the Dirichlet distribution. Returns the belief that the probabilities of K rival events are x_i given that each event has been observed A_i - 1 times.

Usage

```
dirichlet.log.pdf(K.probs, A)
```

Arguments

`K.probs`	vector of probabilities
`A`	vector of concentration parameters.

`dirichlet.pdf` *dirichlet.pdf*

Description

The probability density function for the Dirichlet distribution. Returns the belief that the probabilities of K rival events are x_i given that each event has been observed A_i - 1 times.

Usage

```
dirichlet.pdf(K.probs, A)
```

Arguments

`K.probs`	Vector of probabilities
`A`	Vector of concentration parameters.

`draw.L.given.N0` *draw.L.given.N0*

Description

Sample the L given N0

Usage

```
draw.L.given.N0(N0, prior, EQUIV)
```

Arguments

`N0`	Matrix containing the estimated baseline Poisson distribution for activity
`prior`	Parameter values of a particular prior distribution
`EQUIV`	Parameter sharing controls <- c(S1, S2): S1 <- force sharing of delta (day effect) among days, S2 <- force sharing of eta (time of day) among days, Values: 1 (all days share), 2 (weekdays/weekends), 3 (none)

draw.M.given.Z *draw.M.given.Z*

Description

Sample the M given Z

Usage

```
draw.M.given.Z(Z, prior)
```

Arguments

Z	Binary vector indicationg the presence (1) or absence (0) of an event at every time slice
prior	Parameter values of a particular prior distribution

draw.Z.given.NLM *draw.Z.given.NLM*

Description

Sample the given N, L, M

Usage

```
draw.Z.given.NLM(N, L, M, priors)
```

Arguments

N	Matrix of count data; axis 0 is the number of time intervals per day and axis 1 is the number of days in the data.
L	Matrix containing the rate functions at every time slice
M	Matrix containing the estimated transition probabilities for each iteration
priors	List with parameter values of prior distributions

logp *logp*

Description

Estimates the marginal likelihood of the data using the samples

Usage

```
logp(N, samples, priors, iter, EQUIV)
```

Arguments

N	Matrix of count data; axis 0 is the number of time intervals per day and axis 1 is the number of days in the data.
samples	List of different samples at all time periods
priors	List with parameter values of prior distributions
iter	Number of iterations over which to calcuate likelihood.
EQUIV	Parameter sharing controls <- c(S1, S2): S1 <- force sharing of delta (day effect) among days, S2 <- force sharing of eta (time of day) among days, Values: 1 (all days share), 2 (weekdays/weekends), 3 (none)

mmppr *mmppr.*

Description

mmppr.

prob.L.given.N0 *prob.L.given.N0*

Description

This function evaluates p(L|N0)

Usage

```
prob.L.given.N0(L, N0, prior, EQUIV)
```

Arguments

L	Matrix containing the rate functions at every time slice
N0	Matrix containing the estimated baseline Poisson distribution for activity
prior	Parameter values of a particular prior distribution
EQUIV	Parameter sharing controls <- c(S1, S2): S1 <- force sharing of delta (day effect) among days, S2 <- force sharing of eta (time of day) among days, Values: 1 (all days share), 2 (weekdays/weekends), 3 (none)

---

prob.M.given.Z *prob.M.given.Z*

Description

This function evaluates p(M|Z)

Usage

```
prob.M.given.Z(M, Z, prior)
```

Arguments

M	Matrix containing the estimated transition probabilities for each iteration
Z	Binary vector indicationg the presence (1) or absence (0) of an event at every time slice
prior	Parameter values of a particular prior distribution

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prob.N.given.LM *prob.N.given.LM*

Description

This function evaluates p(N|L, M)

Usage

```
prob.N.given.LM(N, L, M, prior)
```

Arguments

N	Matrix of count data; axis 0 is the number of time intervals per day and axis 1 is the number of days in the data.
L	Matrix containing the rate functions at every time slice
M	Matrix containing the estimated transition probabilities for each iteration
prior	Parameter values of a particular prior distribution

prob.N.given.LZ *prob.N.given.LZ*

Description

This function evaluates p(N|L, Z)

Usage

```
prob.N.given.LZ(N, L, Z, prior)
```

Arguments

N	Matrix of count data; axis 0 is the number of time intervals per day and axis 1 is the number of days in the data.
L	Matrix containing the rate functions at every time slice
Z	Binary vector indicationg the presence (1) or absence (0) of an event at every time slice
prior	Parameter values of a particular prior distribution

repmat *repmat*

Description

This function replicates the matlab function repmat

Usage

```
repmat(X, m, n)
```

Arguments

X	Target matrix
m	New row dimension
n	New column dimension

sensorMMPP *sensorMMPP*

Description

This function provides the main MCMC inference engine

Usage

```
sensorMMPP(N, priors = list(aL = 1, bL = 1, aD = matrix(0, 1, 7) + 5, aH =
  matrix(0, nrow = 48, ncol = 7) + 1, z00 = 0.99 * 10000, z01 = 0.01 * 10000,
  z10 = 0.25 * 10000, z11 = 0.75 * 10000, aE = 5, bE = 1/3, MODE = 0),
  ITERS = c(50, 10), EQUIV = c(3, 3))
```

Arguments

N	Matrix of count data; axis 0 is the number of time intervals per day and axis 1 is the number of days in the data.
priors	List with parameter values of prior distributions
ITERS	Iteration controls: total # of iterations and # used for burn-in
EQUIV	Parameter sharing controls <- c(S1, S2): S1 <- force sharing of delta (day effect) among days, S2 <- force sharing of eta (time of day) among days, Values: 1 (all days share), 2 (weekdays/weekends), 3 (none)

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