Package ‘MBAmethyl’

March 22, 2017

Type Package
Title Model-based analysis of DNA methylation data
Version 1.8.0
Date 2014-10-03
Author Tao Wang, Mengjie Chen
Maintainer Tao Wang <tao.wang.tw376@yale.edu>
Description This package provides a function for reconstructing DNA methylation values from raw measurements. It iteratively implements the group fused lars to smooth related-by-location methylation values and the constrained least squares to remove probe affinity effect across multiple sequences.
Depends R (>= 2.15)
License Artistic-2.0
biocViews DNA Methylation, Methylation Array
NeedsCompilation no

R topics documented:

   MBAmethyl-package               1
   MBAmethyl                      2

Index

MBAmethyl-package       Model-based analysis of DNA methylation data

Description

This package provides functions for reconstructing DNA methylation values from raw measurements. It utilizes both the information from biological replicates and neighboring probes by explicitly modeling the probe-specific effect and encouraging the neighboring similarity by a group fused lasso penalty.
Details

Package: MBAmethyl
Type: Package
Version: 0.99.0
Date: 2014-08-24
License: Artistic-2.0

Author(s)

Tao Wang, Mengjie Chen

Maintainer: Tao Wang <tao.wang.tw376@yale.edu>

References

~~ Literature or other references for background information ~~

Examples

```r
p <- 80
n <- 40
K <- 2
k <- K - 1
cp <- numeric()
L <- c(0, floor(p / K) * (1 : k), p)
cp <- floor(p / K) * (1 : k) + 1

## phi0: probe effects; theta0: true methylation values; part: partition of probe indices
phi0 <- runif(p, 0.5, 2.0)
theta0 <- matrix(0, p, n)
part <- list()

for (s in 1 : K) {
  part[[s]] <- (L[s] + 1) : L[s + 1]
  phi0[part[[s]]] <- phi0[part[[s]]] / sqrt(mean(phi0[part[[s]]]^2))
}
theta0[part[[1]], ] <- rep(1, length(part[[1]]))
theta0[part[[2]], ] <- rep(1, length(part[[2]]))

error <- matrix(runif(p * n, 0, 0.1), p, n)
Y <- theta0 * phi0 + error
fit <- MBAmethyl(Y, steps = 10)
```

MBAmethyl

Model-based analysis of DNA methylation data
**MBAmethyl**

**Description**

This function reconstructs DNA methylation values from raw measurements. It iteratively implements the group fused lars to smooth related-by-location methylation values and the constrained least squares to remove probe affinity effect across multiple sequences. It also contains a criterion-based method (AIC or BIC) for selecting the tuning parameter.

**Usage**

```r
MBAmethyl(Y, wts = .defaultWeights(nrow(Y)), steps = min(dim(Y)) - 1)
```

**Arguments**

- `Y`: An observed matrix ($p \times n$) of methylation values (beta values); $p$ is the number of probes and $n$ is the number of samples;
- `wts`: A pre-specified vector of weights. By default, we use the probe index-dependent weight scheme, $wts_i = \sqrt{\frac{p}{i \cdot (p - i)}}$ for $i = 1, \ldots, p$;
- `steps`: Limit the number of steps taken. One can use this option to perform early stopping.

**Value**

- `ans.aic`: A list corresponds to the AIC, containing estimated beta values, estimated probed effects, estimated change-point locations, residual sum of squares, and degree of freedom.
- `ans.bic`: A list corresponds to the BIC, containing estimated beta values, estimated probed effects, estimated change-point locations, residual sum of squares, and degree of freedom.

**Author(s)**

Tao Wang, Mengjie Chen

**References**

- paper under review

**Examples**

```r
p <- 80
n <- 40
K <- 2
k <- K - 1
cp <- numeric()
L <- c(0, floor(p / K) * (1 : k), p)
cp <- floor(p / K) * (1 : k) + 1

## phi0: probe effects; theta0: true methylation values; part: partition of probe indices
phi0 <- runif(p, 0.5, 2.0)
theta0 <- matrix(0, p, n)
part <- list()

for (s in 1 : K) {
  part[[s]] <- (L[s] + 1) : L[s + 1]
  phi0[part[[s]]] <- phi0[part[[s]]] / sqrt(mean(phi0[part[[s]]]^2))
}
```
theta0[[1]], ] <- rep(1, length(part[[1]]))
theta0[[2]], ] <- rep(1, length(part[[2]]))

error <- matrix(runif(p * n, 0, 0.1), p, n)
Y <- theta0 * phi0 + error
fit <- MBAmethyl(Y, steps = 10)
Index

*Topic methylation
  MBAmethyl, 2
*Topic package
  MBAmethyl-package, 1

MBAmethyl, 2
MBAmethyl-package, 1