Package ‘MBAmethyl’

March 28, 2017

Type Package
Title Model-based analysis of DNA methylation data
Version 1.8.0
Date 2014-10-03
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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 DNAMethylation, MethylationArray
NeedsCompilation no

R topics documented:

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Description

This package provides functions for reconstructing DNA methylation values from raw measurements. It utilize 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

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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**

**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 x 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(p / i / (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)
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## 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)
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