Package ‘arrayMvout’

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Title multivariate outlier detection for expression array QA
Version 1.32.0
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Description This package supports the application of diverse quality
metrics to AffyBatch instances, summarizing these metrics via
PCA, and then performing parametric outlier detection on the
PCs to identify aberrant arrays with a fixed Type I error rate
Depends R (>= 2.6.0), tools, methods, utils, parody, Biobase, affy,
lumi
Suggests MAQCsubset, mvoutData, lumiBarnes, affyPLM, affydata,
hgu133atagcdf
Imports simpleaffy, mdqc, affyContam,
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License Artistic-2.0
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biocViews Infrastructure, Microarray, QualityControl
NeedsCompilation no

R topics documented:

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ArrayOutliers Multivariate outlier detection based on PCA of QA statistics

Description

Multivariate outlier detection based on PCA of QA statistics

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**ArrayOutliers**

### Usage

```r
ArrayOutliers (data, alpha, alphaSeq = c(0.01, 0.05, 0.1), ... )
#   qcOutput = NULL, plmOutput = NULL, degOutput = NULL, prscale = TRUE,
#   pc2use = 1:3)
```

### Arguments

- **data**
  - an (affy) AffyBatch instance with at least 11 samples
- **alpha**
  - false positive rate for outlier detection, adjusting for multiple comparisons according to Caroni and Prescott’s adaptation of Rosner (1983); full report based on this choice of alpha
- **alphaSeq**
  - vector of alpha candidates to be quickly tried for short report
- **...**
  - additional parameters, see below

### Details

Additional parameters may be supplied

- **qcOutput**
  - optional result of simpleaffy qc() to speed computations
- **plmOutput**
  - optional result of affyPLM fitPLM() to speed computations
- **degOutput**
  - optional result of affy AffyRNAdeg() to speed computations
- **prscale**
  - scaling option for prcomp
- **pc2use**
  - selection of principal components to use for outlier detection

Data elements afxsubDEG, afxsubQC, s12cDEG, s12cQC are precomputed RNA degradation and simpleaffy qc() results; s12c is an AffyBatch with digital contamination of some samples.

Data elements maqcQA and itnQA are affymetrix QC statistics on large collections of arrays. Data element ilmQA is a derived from a LumiBatch of the Illumina-submitted MAQC raw data, 19 arrays. (Conveyed by Leming Shi, personal communication). Data element spikQA is a 12x9 matrix of QA parameters obtained for 12 arrays from U133A spikein dataset, with first 2 arrays digitally contaminated as described in Asare et al.

Data element fig3map gives the indices of the points labeled A-H in Figure 3 of the manuscript by Asare et al. associated with this package.

### Value

an instance of arrOutStruct class, a list with a partition of samples into two data frames (inl and outl) with QA summary statistics

### Author(s)

Z. Gao et al.

### Examples

```r
library(simpleaffy)
setQCEnvironment("hgu133acdf") # no CDF corresponding to tag array
if ( require("mvoutData") ) {
  data(s12c)
data(s12cQC)
data(s12cDEG)
```
library(affyPLM)
s12cPset = fitPLM(s12c)
ao = ArrayOutliers(s12c, alpha=0.05, qcOut=s12cQC, plmOut=s12cPset, degOut=s12cDEG)
ao

if (require("lumiBarnes")) {
  library(lumiBarnes)
data(lumiBarnes)
  ArrayOutliers(lumiBarnes, alpha=0.05)
  lb2 = lumiBarnes
  exprs(lb2)[1:20000,1:2] = 10000*exprs(lb2)[1:20000,1:2]
  ArrayOutliers(lb2, alpha=0.05)
}
data(maqcQA) # affy
ArrayOutliers(maqcQA[,-c(1:2)], alpha=.05)
ArrayOutliers(maqcQA[,-c(1:2)], alpha=.01)
data(ilmQA) # illumina
ArrayOutliers(data.frame(ilmQA), alpha=.01)
data(itnQA) # 507 arrays from ITN
ArrayOutliers(itnQA, alpha=.01)

ArrayOutliers-methods

ArrayOutliers – wrapper for platform-specific multivariate outlier detection for expression arrays

Description

wraps functions that perform multivariate outlier detection on dimension-reduced QA statistics of expression arrays

Methods

data = "ANY", alpha = "missing", alphaSeq = "missing" fails; tells user that alpha is obligatory parameter

data = "AffyBatch", alpha = "numeric", alphaSeq = "ANY" performs calibrated multivariate outlier detection on an AffyBatch instance using various affy-specific QA parameters

data = "LumiBatch", alpha = "numeric", alphaSeq = "ANY" performs calibrated multivariate outlier detection on an LumiBatch instance using various illumina-specific QA parameters

data = "data.frame", alpha = "numeric", alphaSeq = "ANY" performs calibrated outlier detection on QA statistics housed in data.frame – all columns of the data entity must be numeric QA statistics for the arrays.

Examples

eample(ArrayOutliers)
arrOutStruct-class

Class "arrOutStruct" container for ArrayOutliers output

Description

Class "arrOutStruct" container for ArrayOutliers output

Objects from the Class

Objects can be created by calls of the form new("arrOutStruct", ...). This class just extends list but has specialized show and plot methods.

Extends

Class "list", from data part. Class "vector", by class "list", distance 2. Class AssayData, by class "list", distance 2.

Methods

plot signature(x = "arrOutStruct", y = "ANY"): a biplot of QA statistics
show signature(object = "arrOutStruct"): summary report

Author(s)

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Examples

data(maqcQA)
f1 = ArrayOutliers(maqcQA[-c(1:2)], alpha=0.01)
names(f1)
f1
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