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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LazyLoad yes

biocViews Infrastructure, Microarray, QualityControl

NeedsCompilation no

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ArrayOutliers Multivariate outlier detection based on PCA of QA statistics

Description

Multivariate outlier detection based on PCA of QA statistics
ArrayOutliers

Usage

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 ac-
cording 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

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] = 1000*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)

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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

eexample(ArrayOutliers)
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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