

# arrayQualityMetrics

October 25, 2011

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addXYfromGAL

*Computing the coordinates of the spots on a slide*

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## Description

From the coordinates of the blocks of a microarray slide and the Row and Column locations of the spots within the blocks, `addXYfromGAL` computes the X and Y coordinates of the spots of a slide.

## Usage

```
addXYfromGAL(x, gal.file, nBlocks, skip, ...)
```

## Arguments

<code>x</code>	is an <code>AnnotatedDataFrame</code> representing the <code>featureData</code> of an object.
<code>gal.file</code>	name of the file <code>.gal</code> that contains the coordinates of the blocks.
<code>nBlocks</code>	number of blocks on the slide.
<code>skip</code>	number of header lines to skip when reading the <code>gal.file</code> .
<code>...</code>	Arguments that get passed on to <code>read.table</code> .

## Value

The object `x` of class `AnnotatedDataFrame` will be returned with two added columns: X and Y corresponding to the absolute position of the probes on the array.

## Author(s)

Audrey Kauffmann, Wolfgang Huber. Maintainer: <kauffmann@bergonie.org>

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`aqm.writereport`      *Write a quality report*

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### Description

`aqm.writereport` produces a quality report (HTML document with figures) from a list of [aqmReportModule](#) objects.

### Usage

```
aqm.writereport(modules, arrayTable, reporttitle, outdir)
```

### Arguments

`modules`            A list of [aqmReportModule](#) objects.  
`arrayTable`        A data.frame with array (meta)data to be displayed in the report.  
`reporttitle, outdir`  
                    Report title and output directory - as in [arrayQualityMetrics](#).

### Value

A side effect of this function is the creation of the HTML report.

### Author(s)

Audrey Kauffmann, Wolfgang Huber

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`aqmReportModule`      *Class to contain all the information to render a quality report module.*

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### Description

Please see the vignette *Advanced topics: Customizing arrayQualityMetrics reports and programmatic processing of the output*.

### Creating Objects

Please see the manual page of the module generations functions, e.g. [aqm.boxplot](#).

### Author(s)

Audrey Kauffmann, Wolfgang Huber

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`arrayQualityMetrics`*Quality metrics for microarray experiments*

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## Description

Produce an array quality metrics report. This is the main function of the package.

## Usage

```
arrayQualityMetrics(expressionset,  
  outdir = reporttitle,  
  force = FALSE,  
  do.logtransform = FALSE,  
  intgroup = NULL,  
  groupprep,  
  spatial = TRUE,  
  reporttitle = paste("arrayQualityMetrics report for", deparse(substitute(expressionset)))
```

## Arguments

<code>expressionset</code>	a Bioconductor microarray dataset container. This can be an object of class <code>ExpressionSet</code> , <code>AffyBatch</code> , <code>NChannelSet</code> , <code>BeadLevelList</code> , <code>RGList</code> , <code>MAList</code> , <code>marrayRaw</code> , <code>marrayNorm</code> .
<code>outdir</code>	the name of the directory in which the report is created; a character of length 1.
<code>force</code>	if the directory named by <code>outdir</code> already exists, then, if <code>force</code> is <code>TRUE</code> , the directory is overwritten, otherwise an error is thrown; if the directory does not exist, the value of <code>force</code> is irrelevant; a logical of length 1.
<code>do.logtransform</code>	indicates whether the data should be logarithm transformed before the analysis; a logical of length 1.
<code>intgroup</code>	the name of the sample covariate(s) used to draw a colour side bar next to the heatmap. The first element of <code>intgroup</code> is also used define sample groups in other plots (boxplots, densities). <code>intgroup</code> should be a character vector, and its elements need to match the columns names of <code>phenoData(expressionset)</code> . If <code>NULL</code> or of length 0, then the plots are not decorated with sample covariate information.
<code>groupprep</code>	deprecated. Use argument <code>intgroup</code> instead.
<code>spatial</code>	indicates whether spatial plots should be made; a logical of length 1. This can be useful for large arrays (like Affymetrix hgu133Plus2) when CPU time and RAM resources of the machine would be limiting.
<code>reporttitle</code>	title for the report (character of length 1).

## Details

See the `arrayQualityMetrics` vignette for examples of this function.

**Value**

A side effect of the function is the creation of directory named by `outdir` containing a HTML report `QMreport.html` and figures. The function also returns a list with R objects containing the report elements for subsequent programmatic processing.

**Author(s)**

Audrey Kauffmann and Wolfgang Huber.

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modulefunctions      *Functions for computing quality report modules.*

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**Description**

These functions produce objects of class `aqmReportModule` representing the various modules of the quality report. Given a list of modules, the report is then rendered by the `aqm.writereport` function.

**Usage**

```
aqm.boxplot(x, subsample=20000, outlierMethod = "KS")
aqm.density(x)
aqm.heatmap(x)
aqm.pca(x)
aqm.maplot(x, subsample=20000, Dthresh=0.15)
aqm.spatial(x, scale="rank", channels = c("M", "R", "G"))
aqm.meansd(x)
aqm.probesmap(x)

# Affymetrix specific sections

aqm.pmmm(x)
aqm.rnadeg(expressionset, x)
aqm.rle(x, outlierMethod = "KS")
aqm.nuse(x, outlierMethod = "upperquartile")
```

**Arguments**

<code>x</code>	An object resulting from a call to <code>prepdata</code> ( <code>expressionset</code> ).
<code>expressionset</code>	An object of class <code>AffyBatch</code> .
<code>subsample</code>	For efficiency, some computations are performed not on the full set of features (which can be hundreds of thousands on some arrays), but on a randomly subset whose size is indicated by this number.
<code>outlierMethod</code>	As in <code>outliers</code> .
<code>Dthresh</code>	In <code>maplot</code> , the arrays with a Hoeffding D statistic larger than this value are called <i>outliers</i> . See also <code>hoeffd</code> .

`scale`, `channels`

In `aqm.spatial`, `scale` determines the choice of the false colour scale in the spatial plots. If the value is `"rank"`, then the colour is proportional to the ranks of the values; if it is `"direct"`, then it is proportional to the values themselves. `channels` determines for which elements of `x` spatial plots are made.

### Details

For a simple example of the `aqm.*` functions, have a look at the source code of the `aqm.pca` function. Please see also the vignette *Advanced topics: Customizing arrayQualityMetrics reports and programmatic processing of the output*.

### Value

An object of class `aqmReportModule`.

### Author(s)

Audrey Kauffmann, Wolfgang Huber

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`outlierDetection` *Represents the results from applying an outlier detection criterion to*

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### Description

The class is described in the vignette *Advanced topics: Customizing arrayQualityMetrics reports and programmatic processing of the output*.

### Author(s)

Audrey Kauffmann, Wolfgang Huber

### See Also

`outliers`

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`outliers` *Helper functions for outlier detection and reporting in*

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### Description

For an overview of outlier detection, please see the corresponding section in the vignette *Advanced topics: Customizing arrayQualityMetrics reports and programmatic processing of the output*. These two functions are helper functions used by the different report generating functions, such as `aqm.boxplot`.

### Usage

```
outliers(exprs, method = c("KS", "sum", "upperquartile"))
boxplotOutliers(x, coef = 1.5)
```

**Arguments**

<code>exprs</code>	A matrix whose columns correspond to arrays, rows to the array features.
<code>method</code>	A character string specifying the summary statistic to be used for each column of <code>exprs</code> . See <a href="#">Details</a> .
<code>x</code>	A vector of real numbers.
<code>coef</code>	A number is called an outlier if it is larger than the upper hinge plus <code>coef</code> times the interquartile range. Upper hinge and interquartile range are computed by <a href="#">fivenum</a> .

**Details**

`outliers`: with argument `method="KS"`, the function first computes for each column of `exprs` (i.e. for each array) the value of the `ks.test` test statistic between its distribution of intensities and the pooled distribution of intensities from all arrays. With `"sum"` and `"upperquartile"`, it computes the sum or the 75 percent quantile. Subsequently, it calls `boxplotOutliers` on these values to identify the outlying arrays.

`boxplotOutliers` uses a criterion similar to that used in `boxplot.stats` to detect outliers in a set of real numbers. The main difference is that in `boxplotOutliers`, only the outliers to the right (i.e. extraordinarily large values) are detected.

**Value**

For `outliers`, an object of class `outlierDetection`. For `boxplotOutliers`, a list with two elements: `thresh`, the threshold against which `x` was compared, and `outliers`, an integer vector of indices.

**Author(s)**

Wolfgang Huber

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```
prepdata
```

*Compute useful summary statistics from a data object.*

---

**Description**

`prepdata` computes summary statistics that are useful for all platforms; `prepaffy` computes Affymetrix-specific ones. These are helper functions used by [arrayQualityMetrics](#).

**Usage**

```
prepdata(expressionset, intgroup, do.logtransform)
prepaffy(expressionset, x)
```

**Arguments**

<code>expressionset</code>	An object of class <a href="#">ExpressionSet</a> for one colour non Affymetrix data, <a href="#">AffyBatch</a> for Affymetrix data, <a href="#">NChannelSet</a> for two colour arrays, or <a href="#">BeadLevelList</a> for Illumina bead arrays.
<code>intgroup, do.logtransform</code>	as in <a href="#">arrayQualityMetrics</a> .
<code>x</code>	A list, typically the result from a prior call to <code>prepdata</code> .

**Details**

See the vignette *Working with arrayQualityMetrics report sections*.

**Value**

A list with various derived quantities. In the case of `prepaffy`, the returned list is `x` with the additional elements appended.

**Author(s)**

Audrey Kauffmann, Wolfgang Huber

# Index

## \*Topic file

addXYfromGAL, 1

## \*Topic manip

addXYfromGAL, 1

addXYfromGAL, 1

addXYfromGAL-methods

(*addXYfromGAL*), 1

AffyBatch, 3, 6

aqm.boxplot, 2, 5

aqm.boxplot (*modulefunctions*), 4

aqm.density (*modulefunctions*), 4

aqm.heatmap (*modulefunctions*), 4

aqm.maplot (*modulefunctions*), 4

aqm.meansd (*modulefunctions*), 4

aqm.nuse (*modulefunctions*), 4

aqm.pca (*modulefunctions*), 4

aqm.pmmm (*modulefunctions*), 4

aqm.probesmap (*modulefunctions*), 4

aqm.rle (*modulefunctions*), 4

aqm.rnadeg (*modulefunctions*), 4

aqm.spatial (*modulefunctions*), 4

aqm.writereport, 2, 4

aqmReportModule, 2, 2, 4, 5

aqmReportModule-class

(*aqmReportModule*), 2

arrayQualityMetrics, 2, 3, 6

BeadLevelList, 3, 6

boxplot.stats, 6

boxplotOutliers (*outliers*), 5

class:aqmReportModule

(*aqmReportModule*), 2

class:outlierDetection

(*outlierDetection*), 5

ExpressionSet, 3, 6

fivenum, 6

hoeffd, 4

ks.test, 6

MAList, 3

marrayNorm, 3

marrayRaw, 3

modulefunctions, 4

NChannelSet, 3, 6

outlierDetection, 5, 6

outlierDetection-class

(*outlierDetection*), 5

outliers, 4, 5, 5

prepaffy (*prepdata*), 6

prepdata, 4, 6

RGList, 3