

Package ‘mimager’

May 20, 2024

Version 1.28.0

Type Package

Title mimager: The Microarray Imager

Description Easily visualize and inspect microarrays for spatial artifacts.

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LazyData TRUE

Depends Biobase

Imports BiocGenerics, S4Vectors, preprocessCore, grDevices, methods, grid, gtable, scales, DBI, affy, affyPLM, oligo, oligoClasses

Collate 'mimager-package.r' 'all-generics.r' 'mimage.r' 'marray.r' 'mindex.r' 'build-legend.r' 'checks.r' 'transformations.r' 'utils-affy.r' 'utils-arrays.r' 'utils-plot.r'

Suggests knitr, rmarkdown, BiocStyle, testthat, lintr, Matrix, abind, affydata, hgu95av2cdf, oligoData, pd.hugene.1.0.st.v1

VignetteBuilder knitr

URL <https://github.com/aaronwolen/mimager>

BugReports <https://github.com/aaronwolen/mimager/issues>

RoxygenNote 5.0.1

biocViews Infrastructure, Visualization, Microarray

git_url <https://git.bioconductor.org/packages/mimager>

git_branch RELEASE_3_19

git_last_commit b3103a9

git_last_commit_date 2024-04-30

Repository Bioconductor 3.19

Date/Publication 2024-05-19

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| | |
|-------|-------------------|
| arank | <i>Array rank</i> |
|-------|-------------------|

Description

Determines the rank of values within each matrix of a three-dimensional array.

Usage

```
arank(x, na.last = TRUE, ties.method = "first")
```

Arguments

| | |
|--------------------------|---|
| <code>x</code> | a three-dimensional array of matrices |
| <code>na.last</code> | for controlling the treatment of NAs . If TRUE, missing values in the data are put last; if FALSE, they are put first; if NA, they are removed; if "keep" they are kept with rank NA. |
| <code>ties.method</code> | a character string specifying how ties are treated, see ‘Details’; can be abbreviated. |

Value

an [array](#) with the same dimensions as `x`

See Also

[rank](#)

Other array.transformations: [arle](#)

Examples

```
# microarray visualization
if (require(affydata, quietly = TRUE)) {
  data("Dilution", package = "affydata")
  x <- arank(marray(Dilution, transpose = TRUE))
}
```

| | |
|------|--------------------------------------|
| arle | <i>Array relative log expression</i> |
|------|--------------------------------------|

Description

The relative log expression (RLE) quantifies the extent to which each sample in a dataset differs from a "reference" sample, which represents each probe's median value across all samples.

Usage

```
arle(x, log2 = TRUE, normalize = TRUE)
```

Arguments

| | |
|-----------|---|
| x | a three-dimensional array of matrices |
| log2 | should values be <code>\$log_2\$</code> transformed |
| normalize | should values be quantile normalized |

Value

an [array](#) with the same dimensions as x

See Also

[RLE](#)

Other array.transformations: [arank](#)

Examples

```
# microarray visualization
if (require(affydata, quietly = TRUE)) {
  data("Dilution", package = "affydata")
  x <- arle(marray(Dilution, transpose = TRUE))
}
```

marray

Microarray array

Description

Convert S4 microarray data structures into a three-dimensional array of matrices, where each matrix corresponds to an individual sample's microarray with values arranged to reflect the physical position of the corresponding feature (i.e., probe) on the microarray surface.

Usage

```
marray(object, type = NULL, select = NULL, transpose = NULL)
```

```
## S4 method for signature 'AffyBatch'
marray(object, type = "pm", select = NULL,
        transpose = FALSE)
```

```
## S4 method for signature 'PLMset'
marray(object, type = "residuals", select = NULL,
        transpose = FALSE)
```

```
## S4 method for signature 'FeatureSet'
marray(object, type = "pm", select = NULL,
        transpose = FALSE)
```

```
## S4 method for signature 'oligoPLM'
marray(object, type = "residuals", select = NULL,
        transpose = FALSE)
```

Arguments

| | |
|-----------|---|
| object | a valid Bioconductor microarray data structure |
| type | for microarray objects type refers to <i>probe type</i> ; for objects containing probe-level models (e.g., PLMsets) type refers to the <i>value type</i> (i.e., "residuals" or "weights"). See probe type section for more information. |
| select | a numeric, character or logical vector indicating samples to include |
| transpose | TRUE (the default), ensures the reconstructed microarrays are vertically oriented, as is typically expected. Set to FALSE to return an array in the orientation strictly specified by the platform coordinates |

Value

three-dimensional [array](#)

Probe types

For microarray data structures the `type` argument determines the *type* of probe that should be included. The following table provides a list of valid values for each supported microarray class:

| | | | | |
|----------------------|-------|------|------|------|
| AffyBatch | "all" | "pm" | "mm" | - |
| ExpressionFeatureSet | "all" | "pm" | "mm" | - |
| GeneFeatureSet | "all" | "pm" | - | "bg" |
| ExonFeatureSet | "all" | "pm" | "mm" | "bg" |
| SnpmFeatureSet | "all" | "pm" | "mm" | - |

Examples

```
if (require(affydata, quietly = TRUE)) {
  data("Dilution", package = "affydata")
  dilution.array <- marray(Dilution, select = c("20A", "10A"))
}
```

mimage

Microarray image

Description

Visualize microarray probe intensities arranged by their physical location on the array. A false color image is produced for each sample in the microarray object and arranged in a grid.

Usage

```
mimage(object, type = NULL, select = NULL, colors = NULL,
  legend.label = NULL, nrow = NULL, ncol = NULL, fixed = FALSE,
  empty.rows = "fill", empty.thresh = 0.6, transform = NULL,
  trim = 0.01, fontsize = 12)

## S4 method for signature 'AffyBatch'
mimage(object, type = "pm", select = NULL,
  colors = NULL, legend.label = "Intensity", nrow = NULL, ncol = NULL,
  fixed = FALSE, empty.rows = "fill", empty.thresh = 0.6,
  transform = log2, trim = 0.01, fontsize = 12)

## S4 method for signature 'PLMset'
mimage(object, type = "residuals", select = NULL,
  colors = NULL, legend.label = type, nrow = NULL, ncol = NULL,
  fixed = FALSE, empty.rows = "fill", empty.thresh = 0.6,
  transform = identity, trim = 0.01, fontsize = 12)

## S4 method for signature 'FeatureSet'
```

```

mimage(object, type = "pm", select = NULL,
        colors = NULL, legend.label = "Intensity", nrow = NULL, ncol = NULL,
        fixed = FALSE, empty.rows = "fill", empty.thresh = 0.6,
        transform = log2, trim = 0.01, fontsize = 12)

## S4 method for signature 'oligoPLM'
mimage(object, type = "residuals", select = NULL,
        colors = NULL, legend.label = type, nrow = NULL, ncol = NULL,
        fixed = FALSE, empty.rows = "fill", empty.thresh = 0.6,
        transform = identity, trim = 0.01, fontsize = 12)

## S4 method for signature 'array'
mimage(object, type = NULL, select = NULL,
        colors = NULL, legend.label = "Values", nrow = NULL, ncol = NULL,
        fixed = FALSE, empty.rows = "ignore", empty.thresh = 1,
        transform = identity, trim = 0, fontsize = 12)

```

Arguments

| | |
|--------------|---|
| object | a valid Bioconductor microarray data structure |
| type | for microarray objects type refers to <i>probe type</i> ; for objects containing probe-level models (e.g., PLMsets) type refers to the <i>value type</i> (i.e., "residuals" or "weights"). See probe type section for more information. |
| select | a numeric, character or logical vector indicating samples to include |
| colors | a vector of colors used to represent probe values |
| legend.label | Legend label |
| nrow | optional, number of rows in grid layout |
| ncol | optional, number of columns in grid layout |
| fixed | Force images to assume a fixed aspect ratio corresponding to their physical dimensions |
| empty.rows | Should empty rows be filled with values from neighboring rows (the default, "fill"), should they be dropped ("drop") entirely, or should they be left alone ("ignore") |
| empty.thresh | what proportion of features must be missing from a row to consider that row empty |
| transform | a function to be applied to the values prior to visualizatio |
| trim | a percentile (default = 0.02) or range or 2 values see trimming section for details |
| fontsize | font size for labels and legend |

Value

invisibly a `gtable` matrix of grobs

Trimming

By default, a 98% winsorization is performed prior to visualization, pulling in values outside of the 1st and 99th percentiles to their respective endpoints. This can be modified using the `trim` argument to provide either a new percentile, or a range of 2 values defining the min/max of the trimmed endpoints. Set `trim = 0` to avoid trimming entirely.

Empty Rows

As a result of platform design, the presence of unindexed probes or probe selection by the user (e.g., including only "pm" probes), the `matrix`-representation of a microarray can contain numerous rows comprised entirely (or mostly) of missing values, which may produce undesirable rasterization artifacts in the microarray image. To avoid this, empty rows are filled with values from a neighboring row. The threshold for what constitutes an empty row can be tweaked with the `empty.thresh` argument.

Probe types

For microarray data structures the `type` argument determines the *type* of probe that should be included. The following table provides a list of valid values for each supported microarray class:

| | | | | |
|----------------------|-------|------|------|------|
| AffyBatch | "all" | "pm" | "mm" | - |
| ExpressionFeatureSet | "all" | "pm" | "mm" | - |
| GeneFeatureSet | "all" | "pm" | - | "bg" |
| ExonFeatureSet | "all" | "pm" | "mm" | "bg" |
| SnpmFeatureSet | "all" | "pm" | "mm" | - |

Examples

```
# standard array visualization
mimage(iris3)

# microarray visualization
if (require(affydata, quietly = TRUE)) {
  data("Dilution", package = "affydata")
  mimage(Dilution, select = c("20A", "10A"))
}
```

Description

mimager simplifies the creation of microarray images (sometimes called "pseudo-images") for the purpose of identifying problematic regional aberrations. Notable features include support for many of Bioconductor's core microarray data structures, providing compatibility with a variety of common microarray platforms, and the ability to visualize multiple microarrays simultaneously.

Details

The following Bioconductor microarray data structures are currently supported:

- [AffyBatch-class](#) for Affymetrix GeneChip probe level data
- [PLMset-class](#) for probe-level linear models fitted to Affymetrix GeneChip probe level data
- [FeatureSet-class](#) for storing Expression/Exon/SNP data from a variety of oligonucleotide platforms
- [oligoPLM-class](#) for probe-level linear models fitted to any of the FeatureSet-like classes

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