Package ‘oligoClasses’

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Title Classes for high-throughput arrays supported by oligo and crlmm

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Enhances doMC, doMPI, doSNOW, doParallel, doRedis

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Description This package contains class definitions, validity checks, and initialization methods for classes used by the oligo and crlmm packages.

License GPL (>= 2)

LazyLoad yes

  utils-parallel.R methods-gSet.R initialize-methods.R
  methods-AlleleSet.R methods-AnnotationatedDataFrame.R
  methods-FeatureSet.R methods-AssayData.R
  methods-SnpFeatureSet.R methods-oligoSnpSet.R
  methods-CopyNumberSet.R methods-CNSet.R methods-PDInfo.R
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  methods-BeadStudioSetList.R methods-gSetList.R
  methods-GRanges.R methods-SummarizedExperiment.R show-methods.R
  functions.R zzz.R

biocViews Infrastructure
## time-stamp-pattern
```
8/Date: %3a %3b %2d %02H:%02M:%02S %Z %:y
```

RoxygenNote 6.1.1

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**AlleleSet-class**

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**affyPlatforms**

**Description**

Provides a listing of available Affymetrix platforms currently supported by the R package oligo.

**Usage**

affyPlatforms()

**Value**

A vector of class character.

**Author(s)**

R. Scharpf

**Examples**

affyPlatforms()

---

**AlleleSet-class**

**Description**

A class for storing the locus-level summaries of the normalized intensities.

**Objects from the Class**

Objects can be created by calls of the form new("AlleleSet", assayData, phenoData, featureData, experimentData, annotation, protocolData, ...).

**Slots**

- assayData: Object of class "AssayData" ~~
- phenoData: Object of class "AnnotatedDataFrame" ~~
- featureData: Object of class "AnnotatedDataFrame" ~~
- experimentData: Object of class "MIAME" ~~
- annotation: Object of class "character" ~~
- protocolData: Object of class "AnnotatedDataFrame" ~~
- __classVersion__: Object of class "Versions" ~~
annotationPackages

Extends

Class "eSet", directly. Class "VersionedBiobase", by class "eSet", distance 2. Class "Versioned", by class "eSet", distance 3.

Methods

allele signature(object = "AlleleSet"): extract allele specific summaries. For 50K (XBA and Hind) and 250K (Sty and Nsp) arrays, an additional argument (strand) must be used (allowed values: 'sense', 'antisense'.

bothStrands signature(object = "AlleleSet"): tests if data contains allele summaries on both strands for a given SNP.

bothStrands signature(object = "SnpFeatureSet"): tests if data contains allele summaries on both strands for a given SnpFeatureSet.

db signature(object = "AlleleSet"): link to database connection.

getA signature(object = "AlleleSet"): average intensities (across alleles)

getM signature(object = "AlleleSet"): log-ratio (Allele A vs. Allele B)

Author(s)

R. Scharpf

See Also

SnpSuperSet, CNSet

Examples

showClass("AlleleSet")
## an empty AlleleSet
x <- new("matrix")
new("AlleleSet", senseAlleleA=x, senseAlleleB=x,
    antisenseAlleleA=x, antisenseAlleleB=x)
## or
new("AlleleSet", alleleA=x, alleleB=x)

---

annotationPackages Annotation Packages

Description

annotationPackages will return a character vector of the names of annotation packages.

Usage

annotationPackages()
Value

A character vector of the names of annotation packages.

Description

Batch statistics used for estimating copy number are stored as AssayData in the 'batchStatistics' slot of the CNSet class. Each element in the AssayData must have the same number of rows and columns. Rows correspond to features and columns correspond to batch.

Objects from the Class

A virtual Class: No objects may be created from it.

Methods

- `batchNames` signature(object = "AssayData"): ...
- `batchNames<-` signature(object = "AssayData"): ...
- `corr` signature(object = "AssayData", allele = "character"): ...
- `nu` signature(object = "AssayData", allele = "character"): ...
- `phi` signature(object = "AssayData", allele = "character"): ...

Details

- `lm`: Extracts entire list of linear model parameters.
- `corr`: The within-genotype correlation of log2(A) and log2(B) intensities.
- `nu`: The intercept for the linear model. The linear model is fit to the A and B alleles independently.
- `phi`: The slope for the linear model. The linear model is fit independently to the A and B alleles.

See Also

- `CNSet-class`

Examples

```r
library(crlmm)
library(Biocbase)
data(cnSetExample, package="crlmm")
cnSet <- cnSetExample
isCurrent(cnSet)
assayDataElementNames(batchStatistics(cnSet))
## Accessors for linear model parameters
## -- Included here primarily as a check that accessors are working
## -- Values are all NA until CN estimation is performed using the crlmm package
```
AssayDataList

Create a list of assay data elements

Description

The eSetList-derived classes have an assayDataList slot instead of an assayData slot.

Usage

AssayDataList(storage.mode = c("lockedEnvironment", "environment", "list"), ...)

Arguments

storage.mode See assayDataNew.
... Named lists of matrices

Value

environment

Author(s)

R.Scharpf

See Also

assayDataNew

Examples

r <- replicate(5, matrix(rnorm(25),5,5), simplify=FALSE)
r <- lapply(r, function(x, dns) {dimnames(x) <- dns; return(x)}, dns=list(letters[1:5], LETTERS[1:5]))
ad <- AssayDataList(r=r)
ls(ad)
Description

Accessor for slot assayDataList in Package oligoClasses

Methods

signature(object = "gSetList") An object inheriting from class gSetList.
signature(object = "oligoSetList") An object inheriting from class gSetList.

batch

The batch variable for the samples.

Description

Copy number estimates are susceptible to systematic differences between groups of samples that were processed at different times or by different labs. While 'batch' is often unknown, a useful surrogate is often the scan date of the arrays (e.g., the month of the calendar year) or the 96 well chemistry plate on which the samples were arrayed during lab processing.

Usage

batch(object)
batchNames(object)
batchNames(object) <- value

Arguments

object An object of class CNSet.
value For 'batchNames', the value must be a character string corresponding of the unique batch names.

Value

The method 'batch' returns a character vector that has the same length as the number of samples in the CNSet object.

Author(s)

R. Scharpf

See Also

CNSet-class
### Examples

```r
a <- matrix(1:25, 5, 5)
colnames(a) <- letters[1:5]
object <- new("CNSet", alleleA=a, batch=rep("batch1", 5))
batch(object)
batchNames(object)
```

### Description

The `batchStatistics` slot contains statistics estimated from each batch that are used to derive copy number estimates.

### Usage

```r
batchStatistics(object)
batchStatistics(object) <- value
```

### Arguments

- **object**  
  An object of class `CNSet`
- **value**  
  An object of class `AssayData`

### Details

An object of class `AssayData` for slot `batchStatistics` is initialized automatically when creating a new `CNSet` instance. Required in the call to `new` is a factor called `batch` whose unique values determine the number of columns for each assay data element.

### Value

`batchStatics` is an accessor for the slot `batchStatistics` that returns an object of class `AssayData`.

### See Also

`CNSet-class, batchNames, batch`
BeadStudioSet-class

Class "BeadStudioSet"

Description
A container for log R ratios and B allele frequencies from SNP arrays.

Objects from the Class
Objects can be created by calls of the form new("BeadStudioSet", assayData, phenoData, featureData, experimentData, annotation, protocolData, baf, lrr, ...).

Slots
featureData: Object of class "GenomeAnnotatedDataFrame" ~
assayData: Object of class "AssayData" ~
phenoData: Object of class "AnnotatedDataFrame" ~
experimentData: Object of class "MIAxE" ~
annotation: Object of class "character" ~
protocolData: Object of class "AnnotatedDataFrame" ~
genome: Object of class "character" ~
__classVersion__: Object of class "Versions" ~

Extends
Class "gSet", directly. Class "eSet", by class "gSet", distance 2. Class "VersionedBiobase", by class "gSet", distance 3. Class "Versioned", by class "gSet", distance 4.

Methods
In the methods below, object has class BeadStudioSet.

baf(object): accessor for the matrix of B allele frequencies.
baf(object) <- value replacement method for B allele frequencies: value must be a matrix of integers.
as(object, "data.frame"): coerce to data.frame with column headers 'lrr', 'baf', 'x' (physical position with unit Mb), 'id', and 'is.snp'. Used for plotting with lattice.
copyNumber(object): accessor for log R ratios.
copyNumber(object) <- value: replacement method for the log R ratios
initialize signature(.Object = "BeadStudioSet"): constructs an instance of the class
lrr(object): accessor for matrix of log R ratios
lrr(object) <- value replacement method for log R ratios: value should be a matrix or a ff_matrix.
show(object): print a short summary of the BeadStudioSet object.
updateObject(object): update a BeadStudioSet object.
BeadStudioSetList-class

Author(s)
R. Scharpf

Examples
new("BeadStudioSet")

---

**BeadStudioSetList-class**

*List classes with assay data listed by chromosome*

**Description**

Container for log R ratios and B allele frequencies stored by chromosome.

**Slots**

- `assayDataList`: Object of class "AssayData"
- `phenoData`: Object of class "AnnotatedDataFrame"
- `featureDataList`: Object of class "list"
- `chromosome`: Object of class "integer"
- `annotation`: Object of class "character"
- `genome`: Object of class "character" indicating the genome build. Valid entries are "hg18" and "hg19".

**Methods defined for the class**

- `clone2(object, id, prefix="",...)`

  Performs a deep copy of the ff objects in the assay data elements of `object`. A new object of the same class will be instantiated. The ff objects in the instantiated object will point to ff files on disk with prefix given by the argument `prefix`.

  A use-case for such a function is that one may want to perform wave correction on the log R ratios in `object`, but keep a copy of the original unadjusted log R ratios. If `object` is not copied using `clone2` prior to wave correction, the log R ratios will be updated on disk and the original, unadjusted log R ratios will no longer be available.

**Accessors**

- `baf(object)` An accessor for the B allele frequencies (BAFs). The accessor returns a list where each element of the list is a matrix of the BAFs for the corresponding element in the `SetList` object. While the BAFs have a range [0, 1], they are often saved internally as integers by multiplying the original BAFs by 1000. Users can restore the original scale by dividing by 1000.
lrr(object) An accessor for the log R ratios, an estimate of the copy number (presumably relative to diploid copy number) at each marker on a SNP array. The accessor returns a list where each element of the list is a matrix of the log R ratios for the corresponding element in the SetList object. The log R ratios are often saved internally as integers by multiplying the original LRRs by 100 in order to reduce the memory footprint of large studies. Users can restore the original scale by dividing by 100.

Author(s)

R. Scharpf

See Also

See supporting packages for methods defined for the class.

celfileDate

Cel file dates

Description

Parses cel file dates from the header of .CEL files for the Affymetrix platform

Usage

celfileDate(filename)

Arguments

filename Name of cel file

Value

character string

Author(s)

H. Jaffee

Examples

require(hapmapsnp6)
path <- system.file("celFiles", package="hapmapsnp6")
celfiles <- list.celfiles(path, full.names=TRUE)
dts <- sapply(celfiles, celfileDate)
celfileName

Extracts complete cel file name from a CNSet object

Description

Returns the complete cel file (including path) for a CNSet object

Usage

celfileName(object)

Arguments

object An object of class CNSet

Value

Character string vector.

Note

If the CEL files for an experiment are relocated, the datadir should be updated accordingly. See examples.

Author(s)

R. Scharpf

Examples

## Not run:
if(require(crlmm)){
  data(cnSetExample, package="crlmm")
celfileName(cnSetExample)
}

## End(Not run)
checkExists

Checks to see whether an object exists and, if not, executes the appropriate function.

Description

Only loads an object if the object name is not in the global environment. If not in the global environment and the file exists, the object is loaded (by default). If the file does not exist, the function FUN is run.

Usage

checkExists(.name, .path = ".", .FUN, .FUN2, .save.it=TRUE, .load.it, ...)

Arguments

- `.name` Character string giving name of object in global environment
- `.path` Path to where the object is saved.
- `.FUN` Function to be executed if `<name>` is not in the global environment and the file does not exist.
- `.FUN2` Not currently used.
- `.save.it` Logical. Whether to save the object to the directory indicated by path. This argument is ignored if the object was loaded from file or already exists in the `.GlobalEnv`.
- `.load.it` Logical. If load.it is TRUE, we try to load the object from the indicated path. The returned object will replace the object in the `.GlobalEnv` unless the object is bound to a different name (symbol) when the function is executed.
- `...` Additional arguments passed to FUN.

Value

Could be anything – depends on what FUN, FUN2 perform.

Future versions could return a 0 or 1 indicating whether the function performed as expected.

Author(s)

R. Scharpf

Examples

```r
path <- tempdir()
dir.create(path)
x <- 3+6
x <- checkExists("x", .path=path, .FUN=function(y, z) y+z, y=3, z=6)
rm(x)
x <- checkExists("x", .path=path, .FUN=function(y, z) y+z, y=3, z=6)
```
checkOrder

rm(x)
x <- checkExists("x", .path=path, .FUN=function(y, z) y+z, y=3, z=6)
rm(x)
##now there is a file called x.rda in tempdir(). The file will be loaded
x <- checkExists("x", .path=path, .FUN=function(y, z) y+z, y=3, z=6)
rm(x)
unlink(path, recursive=TRUE)

checkOrder

Checks whether a eSet-derived class is ordered by chromosome and physical position

Description

Checks whether a eSet-derived class (e.g., a SnpSet or CNSet object) is ordered by chromosome and physical position

Usage

checkOrder(object, verbose = FALSE)
chromosomePositionOrder(object, ...)

Arguments

object A SnpSet or CopyNumberSet.
verbose Logical.
... additional arguments to order

Details

Checks whether the object is ordered by chromosome and physical position.

Value

Logical

Author(s)

R. Scharpf

See Also

order
Examples

```r
data(oligoSetExample)
if(!checkOrder(oligoSet)){
  oligoSet <- chromosomePositionOrder(oligoSet)
}
checkOrder(oligoSet)
```

---

### Methods for function chromosome in package oligoClasses

#### Description

Methods for function chromosome in package **oligoClasses**

#### Methods

The methods for chromosome extracts the chromosome (represented as an integer) for each marker in a eSet-derived class or a AnnotatedDataFrame-derived class.

- `signature(object = "AnnotatedDataFrame")`: Accessor for chromosome.
- `signature(object = "eSet")`: If `chromosome` is included in `fvarLabels(object)`, the integer representation of the chromosome will be returned. Otherwise, an error is thrown.
- `signature(object = "GenomeAnnotatedDataFrame")`: Accessor for chromosome. If annotation was not available due to a missing or non-existent annotation package, the value returned by the accessor will be a vector of zero’s.
- `chromosome(object) <- value`: Assign chromosome to the AnnotatedDataFrame slot of an eSet-derived object.
- `signature(object = "RangedDataCNV")`: Accessor for chromosome.

#### Note

Integer representation: chr X = 23, chr Y = 24, chr XY = 25. Symbols M, Mt, and MT are coded as 26.

#### See Also

- `chromosome2integer`

#### Examples

```r
chromosome2integer(c(1:22, "X", "Y", "XY", "M"))
```
chromosome2integer

Converts chromosome to integer

Description

Coerces character string for chromosome in the pd. annotation packages to integers

Usage

```r
chromosome2integer(chrom)
integer2chromosome(intChrom)
```

Arguments

- `chrom` A one or 2 letter character string (e.g, "1", "X", "Y", "MT", "XY")
- `intChrom` An integer vector with values 1-25 possible

Details

This is useful when sorting SNPs in an object by chromosome and physical position – ensures that the sorting is done in the same way for different objects.

Value

`integer2chromosome` returns a vector of character string indicating the chromosome the same length as `intChrom`. `chromosome2integer` returns a vector of integers the same length as the number of elements in the `chrom` vector.

Author(s)

R. Scharpf

Examples

```r
chromosome2integer(c(1:22, "X", "Y", "XY", "M"))
integer2chromosome(chromosome2integer(c(1:22, "X", "Y", "XY", "M")))
```
Description

CNSet is a container for intermediate data and parameters pertaining to allele-specific copy number estimation. Methods for CNSet objects, including accessors for linear model parameters and allele-specific copy number are included here.

Objects from the Class

An object from the class is not generally intended to be initialized by the user, but returned by the genotype function in the crlmm package.

The following creates a very basic CNSet with assayData containing the required elements.

```r
new(CNSet, alleleA=new("matrix"), alleleB=new("matrix"), call=new("matrix"), callProbability=new("matrix"), batch=new("factor"))
```

Slots

- `batch`: Object of class "factor"
- `batchStatistics`: Object of class "AssayData"
- `assayData`: Object of class "AssayData"
- `phenoData`: Object of class "AnnotatedDataFrame"
- `featureData`: Object of class "AnnotatedDataFrame"
- `experimentData`: Object of class "MIAME"
- `annotation`: Object of class "character"
- `protocolData`: Object of class "AnnotatedDataFrame"
- `datadir`: Object of class "list"
- `mixtureParams`: Object of class "matrix"
- `__classVersion__`: Object of class "Versions"

Methods

The argument `object` for the following methods is a CNSet.

- `object[i, j]`: subset the CNSet object by markers (i) and/or samples (j).
- `A(object)`: accessor for the normalized intensities of allele A
- `A(object) <- value`: replace intensities for the A allele intensities by value. The object value must be a matrix, ff_matrix, or ffdf.
- `allele(object, allele)`: accessor for the normalized intensities for the A or B allele. The argument for allele must be either 'A' or 'B'
- `B(object)`: accessor for the normalized intensities of allele B
B(object) <- value: replace intensities for the B allele intensities by value. The object value must be a matrix, ff_matrix, or ffdf.

batch(object): vector of batch labels for each sample.

batchNames(object): the unique batch names

batchNames(object) <- value: relabel the batches

calls(object): accessor for genotype calls coded as 1 (AA), 2 (AB), or 3 (BB). Nonpolymorphic markers are NA.

confs(object): accessor for the genotype confidence scores.

close(object): close any open file connections to ff objects stored in the CNSet object.

as(object, "oligoSnpSet"): coerce a CNSet object to an object of class oligoSnpSet – a container for the total copy number and genotype calls.

corr(object): the correlation of the A and B intensities within each genotype.

flags(object): flags to indicate possible problems with the copy number estimation. Not fully implemented at this point.

c("CNSet"): instantiating a CNSet object.

nu(object, allele): accessor for the intercept (background) for the A and B alleles. The value of allele must be 'A' or 'B'.

open(object) open file connections for all ff objects stored in the CNSet object.

nu(object, allele): accessor for the slope for the A and B alleles. The value of allele must be 'A' or 'B'.

sigma2(object, allele): accessor for the within genotype variance

tau2(object, allele): accessor for background variance

Author(s)

R. Scharpf

Examples

new("CNSet")

CopyNumberSet-class  Class "CopyNumberSet"

Description

Container for storing total copy number estimates and confidence scores of the copy number estimates.

Objects from the Class

Objects can be created by calls of the form new("CopyNumberSet", assayData, phenoData, featureData, experimentData, annotation, protocolData, copyNumber, cnConfidence, ...).
Slots

assayData: Object of class "AssayData"
phenoData: Object of class "AnnotatedDataFrame"
featureData: Object of class "AnnotatedDataFrame"
experimentData: Object of class "MIAxE"
annotation: Object of class "character"
protocolData: Object of class "AnnotatedDataFrame"
.__classVersion__: Object of class "Versions"

Extends

Class "eSet", directly. Class "VersionedBiobase", by class "eSet", distance 2. Class "Versioned", by class "eSet", distance 3.

Methods

cnConfidence signature(object = "CopyNumberSet"): ...
cnConfidence<- signature(object = "CopyNumberSet", value = "matrix"): ...
coerce signature(from = "CNSet", to = "CopyNumberSet"): ...
copyNumber signature(object = "CopyNumberSet"): ...
copyNumber<- signature(object = "CopyNumberSet", value = "matrix"): ...
initialize signature(.Object = "CopyNumberSet"): ...

Note

This container is primarily for platforms for which genotypes are unavailable. As oligoSnpSet extends this class, methods related to total copy number that do not depend on genotypes can be defined at this level.

Author(s)

R. Scharpf

See Also

For genotyping platforms, total copy number estimates and genotype calls can be stored in the oligoSnpSet class.

Examples

showClass("CopyNumberSet")
cnset <- new("CopyNumberSet")
ls(Biobase::assayData(cnset))
Methods for class CopyNumberSet.

Description

Accessors and CopyNumberSet

Usage

```r
copyNumber(object, ...)  
cnConfidence(object)  
```

```r
copyNumber(object) <- value  
cnConfidence(object) <- value
```

Arguments

<table>
<thead>
<tr>
<th>object</th>
<th>CopyNumberSet object or derived class</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
<td>Ignored for CopyNumberSet and oligoSnpSet.</td>
</tr>
<tr>
<td>value</td>
<td>matrix</td>
</tr>
</tbody>
</table>

Value

copyNumber returns a matrix of copy number estimates or relative copy number estimates. Since the copy number estimates are stored as integers (copy number * 100), the matrix returned by the copyNumber accessor will need to be divided by a factor of 100 to transform the measurements back to the original copy number scale.

cnConfidence returns a matrix of confidence scores for the copy number estimates. These are also represented as integers and will require a back-transformation to the original scale.

Examples

```r
library(Biobase)  
data(locusLevelData)  
path <- system.file("extdata", package="oligoClasses")  
fd <- readRDS(file.path(path, "genomeAnnotatedDataFrameExample.rds"))  
## the following command creates an 'oligoSnpSet' object, storing  
## an integer representation of the log2 copy number in the 'copyNumber' element  
## of the assayData. Genotype calls and genotype confidence scores are also stored  
## in the assayData.  
oligoSet <- new("oligoSnpSet",  
copyNumber=integerMatrix(log2(locusLevelData["copynumber"])/100), 100),  
call=locusLevelData["genotypes"],  
callProbability=integerMatrix(locusLevelData["crlmmConfidence"], 1),  
annotation=locusLevelData["platform"],  
featureData=fd,  
genome="hg19")
```
## There are several accessors for the oligoSnpSet class.
icn <- copyNumber(oligoSet)
range(icn) ## integer scale
lcn <- icn/100
range(lcn) ## log2 copy number

## confidence scores for the genotypes are also represented on an integer scale
ipr <- snpCallProbability(oligoSet)
range(ipr) ## integer scale

## for genotype confidence scores, the helper function i2p
## converts back to a probability scale
pr <- i2p(ipr)
range(pr)

## The helper function confs is a shortcut, extracting the
## integer-based confidence scores and transforming to the
## probability scale
pr2 <- confs(oligoSet)
all.equal(pr, pr2)

## To extract information on the annotation of the SNPs, one can use
position(oligoSet)
chromosome(oligoSet)
## the position and chromosome coordinates were extracted from build hg19
geneBuild(oligoSet)

---

**createFF**

Create ff objects.

### Description

Creates ff objects (array-like) using settings (path) defined by oligoClasses.

### Usage

createFF(name, dim, vmode = "double", initdata = NULL)

### Arguments

- **name**: Prefix for filename.
- **dim**: Dimensions.
- **vmode**: Mode.
- **initdata**: NULL.

### Value

ff object.
Note

This function is meant to be used by developers.

See Also

ff

---

**db** *Get the connection to the SQLite Database*

Description

This function will return the SQLite connection to the database associated to objects used in oligo.

Usage

```
db(object)
```

Arguments

- **object**
  
  Object of valid class. See methods.

Value

SQLite connection.

Methods

- `object = "FeatureSet"` object of class FeatureSet
- `object = "SnpCallSet"` object of class SnpCallSet
- `object = "DBPDInfo"` object of class DBPDInfo
- `object = "SnpLevelSet"` object of class SnpLevelSet

Author(s)

Benilton Carvalho

Examples

```
## db(object)
```
Class "DBPDInfo"

Description
A class for Platform Design Information objects, stored using a database approach.

Objects from the Class
Objects can be created by calls of the form `new("DBPDInfo", ...)`. 

Slots
- `getdb`: Object of class "function"
- `tableInfo`: Object of class "data.frame"
- `manufacturer`: Object of class "character"
- `genomebuild`: Object of class "character"
- `geometry`: Object of class "integer" with length 2 (rows x columns)

Methods
- `annotation`: string describing annotation package associated to object

Deprecated
The function, class, or data object you asked for has been deprecated.

ExpressionFeatureSet Object

Description
Example of ExpressionFeatureSet Object.

Usage
`data(efsExample)`
**exprs-methods**

**Format**

Object belongs to ExpressionFeatureSet class.

**Examples**

```r
data(efsExample)
class(efsExample)
```

---

**Description**

Accessor for the 'exprs' slot of FeatureSet-like objects

**Methods**

- `object = "ExpressionSet"` Expression matrix for objects of this class. Usually results of preprocessing algorithms, like RMA.
- `object = "FeatureSet"` General container 'exprs' inherited from eSet
- `object = "SnpSet"` General container 'exprs' inherited from eSet, not yet used.

---

**featureDataList-methods**

Accessor for slot featureDataList in Package *oligoClasses*

---

**Description**

Accessor for slot featureDataList in Package *oligoClasses*

**Methods**

- `signature(object = "gSetList")` An object inheriting from class gSetList.
FeatureSet-class  "FeatureSet" and "FeatureSet" Extensions

Description

Classes to store data from Expression/Exon/SNP/Tiling arrays at the feature level.

Objects from the Class

The FeatureSet class is VIRTUAL. Therefore users are not able to create instances of such class.

Objects for FeatureSet-like classes can be created by calls of the form: new(CLASSNAME, assayData, manufacturer, platform, exprs, phenoData, featureData, experimentData, annotation, ...). But the preferred way is using parsers like read.celfiles and read.xysfiles.

Slots

manufacturer: Object of class "character"
assayData: Object of class "AssayData"
phenoData: Object of class "AnnotatedDataFrame"
featureData: Object of class "AnnotatedDataFrame"
experimentData: Object of class "MIAME"
annotation: Object of class "character"
__.classVersion__: Object of class "Versions"

Methods

show signature(.Object = "FeatureSet"): show object contents
bothStrands signature(.Object = "SnpFeatureSet"): checks if object contains data for both strands simultaneously (50K/250K Affymetrix SNP chips - in this case it returns TRUE); if object contains data for one strand at a time (SNP 5.0 and SNP 6.0 - in this case it returns FALSE)

Author(s)

Benilton Carvalho

See Also

eSet, VersionedBiobase, Versioned

Examples

set.seed(1)
tmp <- 2^matrix(rnorm(100), ncol=4)
rownames(tmp) <- 1:25
colnames(tmp) <- paste("sample", 1:4, sep="")
efs <- new("ExpressionFeatureSet", exprs=tmp)
Description

Extended package ff's class definitions for ff to S4.

Objects from the Class

A virtual Class: No objects may be created from it.

Slots

.S3Class: Object of class ffdf ~

Extends

Class "oldClass", directly. Class "list_or_ffdf", directly.

Methods

No methods defined with class "ffdf" in the signature.

Class "ff_matrix"

Description

~~ A concise (1-5 lines) description of what the class is. ~~

Objects from the Class

A virtual Class: No objects may be created from it.

Slots

.S3Class: Object of class "character" ~

Extends

Class "oldClass", directly.

Methods

annotatedDataFrameFrom signature(object = "ff_matrix"): ...

Examples

showClass("ff_matrix")
ff_or_matrix-class  Class "ff_or_matrix"

Description
A class union of 'ffdf', 'ff_matrix', and 'matrix'

Objects from the Class
A virtual Class: No objects may be created from it.

Methods

GenomeAnnotatedDataFrameFrom signature(object = "ff_or_matrix"): ...

Author(s)
R. Scharpf

See Also
ff, ffdf

Examples
showClass("ff_or_matrix")

fileConnections  Open and close methods for matrices and numeric vectors

Description
CNSet objects can contain ff-derived objects that contain pointers to files on disk, or ordinary matrices. Here we define open and close methods for ordinary matrices and vectors that that simply pass back the original matrix/vector.

Usage
open(con, ...)
openff(object)
closeff(object)

Arguments
con matrix or vector
object A CNSet object.
... Ignored
Value
not applicable

Author(s)
R. Scharpf

Examples
open(rnorm(15))
open(matrix(rnorm(15), 5,3))

---

flags

Batch-level summary of SNP flags.

Description
Used to flag SNPs with low minor allele frequencies, or for possible problems during the CN estimation step. Currently, this is primarily more for internal use.

Usage
flags(object)

Arguments
object An object of class CNSet

Value
A matrix or ff_matrix object with rows corresponding to markers and columns corresponding to batch.

See Also
batchStatistics

Examples
x <- matrix(runif(250*96*2, 0, 2), 250, 96*2)
test1 <- new("CNSet", alleleA=x, alleleB=x, call=x, callProbability=x,
batch=as.character(rep(letters[1:2], each=96)))
dim(flags(test1))
GenomeAnnotatedDataFrame-class

Description

Miscellaneous generics. Methods defined in packages that depend on oligoClasses

Usage

baf(object)
lrr(object)

Arguments

object A eSet-derived class.

Author(s)

R. Scharpf

GenomeAnnotatedDataFrame-class

Class "GenomeAnnotatedDataFrame"

Description

AnnotatedDataFrame with genomic coordinates (chromosome, position)

Slots

varMetadata: Object of class "data.frame"

data: Object of class "data.frame"

dimLabels: Object of class "character"

.__classVersion__: Object of class "Versions"

Extends

Class "AnnotatedDataFrame", directly. Class "Versioned", by class "AnnotatedDataFrame", distance 2.
Coercion to or from other classes

as(from, "GenomeAnnotatedDataFrame"):
Coerce an object of class AnnotatedDataFrame to a GenomeAnnotatedDataFrame.

makeFeatureGRanges(object, genome, ...):
Construct a GRanges instance from a GenomeAnnotatedDataFrame object. genome is a character string indicating the UCSC build. Supported builds are "hg18" and "hg19", but are platform specific. In particular, some platforms only support build hg19 at this time.

updateObject(object):
For updating a GenomeAnnotatedDataFrame

Accessors

chromosome(object), chromosome(object) <- value
Get or set chromosome.

isSnp(object):
Many platforms include polymorphic and nonpolymorphic markers. isSnp evaluates to TRUE if the marker is polymorphic.

position(object):
Physical position in the genome

getArm(object, genome):
Retrieve character vector indicating the chromosome arm of each marker in object. genome should indicate which genome build was used to define the chromosomal locations (currently, only UCSC genome builds 'hg18' and 'hg19' supported for this function).

Author(s)

R. Scharpf

GenomeAnnotatedDataFrameFrom is a convenience for creating GenomeAnnotatedDataFrame objects.
Methods

Use the method with GenomeAnnotatedDataFrameFrom(object, annotationPkg, genome, ...); the argument annotationPkg must be specified for matrix and AssayData classes.

signature(object="assayData") This method creates an GenomeAnnotatedDataFrame using feature names and dimensions of an AssayData object as a template.

signature(object="matrix") This method creates an GenomeAnnotatedDataFrame using row names and dimensions of a matrix object as a template.

signature(object="NULL") This method (called with 'NULL' as the object) creates an empty GenomeAnnotatedDataFrame.

signature(object="array") This method (called with 'array' as the object) creates a GenomeAnnotatedDataFrame using the first dimension of the array (rows are the number of features).

Author(s)

R Scharpf

Examples

```r
require(Biobase)
minReqVersion <- "1.0.2"
require(human370v1cCrlmm)
if (packageDescription("human370v1cCrlmm", fields='Version') >= minReqVersion){
x <- matrix(1:25, 5, 5,
dimnames=list(c("rs10000092","rs1000055", "rs100016", "rs10003241", "rs10004197"), NULL))
gd <- GenomeAnnotatedDataFrameFrom(x, annotationPkg="human370v1cCrlmm",
genome="hg18")
pData(gd)
chromosome(gd)
position(gd)
}
```

Description

Returns the genome build. This information comes from the annotation package and is given as an argument during the package creation process.

Usage

genomeBuild(object)

Arguments

object Supported objects include PDInfo, FeatureSet, and any gSet-derived or eSetList-derived object.
**geometry**

Value

character string

Note

Supported builds are UCSC genome builds are 'hg18' and 'hg19'.

Examples

```r
showMethods("genomeBuild", where="package:oligoClasses")
```

---

---

### Description

For a given array, `geometry` returns the physical geometry of it.

### Usage

```r
gometry(object)
```

### Arguments

- **object**: PDInfo or FeatureSet object

### Examples

```r
if (require(pd.mapping50k.xba240))
gometry(pd.mapping50k.xba240)
```

---

---

### Description

Methods to compute average log-intensities and log-ratios across alleles, within strand.

### Usage

```r
getA(object)
getM(object)
A(object, ...)
B(object, ...)
```
Arguments

object  SnpQSet, SnpCnvQSet or TilingFeatureSet2 object.
... arguments to be passed to allele - 'sense' and 'antisense' are valid values if
the array is pre-SNP_5.0

Details

For SNP data, SNPRMA summarizes the SNP information into 4 quantities (log2-scale):

- antisenseThetaAantisense allele A. (Not applicable for Affymetrix 5.0 and 6.0 platforms.)
- antisenseThetaBantisense allele B. (Not applicable for Affymetrix 5.0 and 6.0 platforms.)
- senseThetaAsense allele A. (Not applicable for Affymetrix 5.0 and 6.0 platforms.)
- senseThetabssense allele B. (Not applicable for Affymetrix 5.0 and 6.0 platforms.)
- allelAAffymetrix 5.0 and 6.0 platforms
- allelBAffymetrix 5.0 and 6.0 platforms

The average log-intensities are given by: \((antisenseThetaA + antisenseThetaB)/2\) and \((senseThetaA + senseThetaB)/2\).
The average log-ratios are given by: \(antisenseThetaA - antisenseThetaB\) and \(senseThetaA - senseThetaB\).

For Tiling data, getM and getA return the log-ratio and average log-intensities computed across
channels: \(M = \log_2(\text{channel1}) - \log_2(\text{channel2})\) \(A = (\log_2(\text{channel1}) + \log_2(\text{channel2}))/2\)

When large data support is enabled with the ff package, the AssayData elements of an AlleleSet
object can be ff_matrix or ffdf, in which case pointers to the ff object are stored in the assay data.
The functions open and close can be used to open or close the connection, respectively.

Value

A 3-dimensional array (SNP’s x Samples x Strand) with the requested measure, when the input SNP
data (50K, 250K).

A 2-dimensional array (SNP’s x Samples), when the input is from SNP 5.0 and SNP 6.0 arrays.

A 2-dimensional array if the input is from Tiling arrays.

See Also

snprma
**getBar**

*Gets a bar of a given length.*

**Description**

Gets a bar of a given length.

**Usage**

```r
getBar(width = getOption("width"))
```

**Arguments**

- `width`  
  desired length of the bar.

**Value**

character string.

**Author(s)**

Benilton S Carvalho

**Examples**

```r
message(getBar())
```

---

**getSequenceLengths**

*Load chromosome sequence lengths for UCSC genome build hg18 or hg19*

**Description**

Load chromosome sequence lengths for UCSC genome build hg18 or hg19

**Usage**

```r
gETCHromosomeSequenceLengths(build)
```

**Arguments**

- `build`  
  character string: "hg18" or "hg19"

**Details**

The chromosome sequence lengths for UCSC builds hg18 and hg19 were extracted from the packages BSgenome.Hsapiens.UCSC.hg18 and BSgenome.Hsapiens.UCSC.hg19, respectively.
Value

Names integer vector of chromosome lengths.

Author(s)

R. Scharpf

Examples

getSequenceLengths("hg18")
getSequenceLengths("hg19")

if(require("GenomicRanges")){
  ## from GenomicRanges
  sl <- getSequenceLengths("hg18")[c("chr1", "chr2", "chr3")]
  gr <-
    GRanges(seqnames =
      Rle(c("chr1", "chr2", "chr1", "chr3"), c(1, 3, 2, 4)),
      ranges =
      IRanges(1:10, width = 10:1, names = head(letters,10)),
      strand =
      Rle(strand(c("-", "+", "x", "+", "-")),
        c(1, 2, 3, 2)),
      score = 1:10,
      seqlengths=sl)
  metadata(gr) <- list(genome="hg18")
  gr
  metadata(gr)
}

---

GRanges-methods  Methods for GRanges objects

Description

Methods for GRanges objects

findOverlaps methods

findOverlaps(query, subject, ...):

Find the feature indices in subject that overlap the genomic intervals in query, where query
is a GRanges object and subject is a gSet-derived object. Additional arguments to the findOverlaps
method in the package IRanges can be passed through the ... operator.
Accessors

object is an instance of the GRanges class.

coverage2(object):
   For the GRanges and GRangesList objects returned by the hidden Markov model implemented in the "VanillaICE" package and the segmentation algorithm in the "MinimumDistance" package, the intervals are annotated by the number of probes (markers) for SNPs and nonpolymorphic regions. coverage2 and numberProbes are convenient accessors for these annotations.

genomeBuild(object):
   Accessor for the UCSC genome build.

numberProbes(object):
   Integer vector indicating the number of probes (markers) for each range in object. Equivalent to coverage2.

state(object):
   Accessor for the elementMetadata column 'state', when applicable. State is used to contain the index of the inferred copy number state for various hmm methods defined in the VanillaICE.

See Also

GRanges

Examples

library(IRanges)
library(GenomicRanges)
g1 <- GRanges(seqnames = "chr2", ranges = IRanges(3, 6),
state=3L, numberProbes=100L)
   ## convenience functions
   state(g1)
   numberProbes(g1)

g2 <- GRanges(seqnames = c("chr1", "chr1"),
ranges = IRanges(c(7,13), width = 3),
state=c(2L, 2L), numberProbes=c(200L, 250L))
g3 <- GRanges(seqnames = c("chr1", "chr2"),
ranges = IRanges(c(1, 4), c(3, 9)),
state=c(1L, 4L), numberProbes=c(300L, 350L))
   ## Ranges organized by sample
gL <- GRangesList("sample1" = g1, "sample2" = g2, "sample3" = g3)
sampleNames(gL) ## same as names(gL)
   numberProbes(gL)
   chromosome(gL)
   state(gL)
g <- stack(gL)
sampleNames(g)
   chromosome(g)
   state(g)
gSet-class

Description

Container for objects with genomic annotation on SNPs

Objects from the Class

A virtual Class: No objects may be created from it.

Slots

- **featureData**: Object of class "GenomeAnnotatedDataFrame"
- **assayData**: Object of class "AssayData"
- **phenoData**: Object of class "AnnotatedDataFrame"
- **experimentData**: Object of class "MIAxE"
- **annotation**: Object of class "character"
- **protocolData**: Object of class "AnnotatedDataFrame"
- **genome**: Object of class "character"
- **__classVersion__**: Object of class "Versions"

Extends

Class "eSet", directly. Class "VersionedBiobase", by class "eSet", distance 2. Class "Versioned", by class "eSet", distance 3.

Methods

The object for the below methods is a class that extends the virtual class gSet.

- **checkOrder(object)**: checks that the object is ordered by chromosome and physical position. Returns logical.
- **chromosome(object)**: accessor for chromosome in the GenomeAnnotatedDataFrame slot.
- **chromosome(object) <- value**: replacement method for chromosome in the GenomeAnnotatedDataFrame slot. value must be an integer vector.
- **db(object)**: database connection
- **genomeBuild(object), genomeBuild(object) <- value**: Get or set the UCSC genome build. Supported builds are hg18 and hg19.
- **getArm(object)**: Character genome build indicating the chromosomal arm for each marker in object.
- **isSnp(object)**: whether the marker is polymorphic. Returns a logical vector.
- **makeFeatureGRanges(object)**: Construct an instance of the GRanges class from a GenomeAnnotatedDataFrame.
- **position(object)**: integer vector of the genomic position
- **show(object)**: Print a concise summary of object.
gSetList-class

Author(s)

R. Scharpf

See Also

chromosome, position, isSnp

Examples

showClass("gSet")

---

gSetList-class  Virtual Class for Lists of eSets

Description

Virtual Class for Lists of eSets.

Objects from the Class

A virtual Class: No objects may be created from it.

Slots

- assayDataList: Object of class "AssayData"
- phenoData: Object of class "AnnotatedDataFrame"
- protocolData: Object of class "AnnotatedDataFrame"
- experimentData: Object of class "MIAME"
- featureDataList: Object of class "list"
- chromosome: Object of class "vector"
- annotation: Object of class "character"
- genome: Object of class "character"

Accessors

object is an instance of a gSetList-derived class.

- annotation(object):
  character string indicating the package used to provide annotation for the features on the array.
- chromosome(object):
  Returns the chromosome corresponding to each element in the gSetList object
- elementNROWS(object): Returns the number of rows for each list of assays. In most gSetList-derived classes, the assays are organized by chromosome and elementNROWS returns the number of markers for each chromosome.
- genomeBuild(object), genomeBuild(object) <- value:
  Get or set the UCSC genome build. Supported builds are hg18 and hg19.
Coercion

object is an instance of a gSetList-derived class.

`makeFeatureGRanges(object, ...)`:
Create a GRanges object for the featureData. The featureData is stored as a list. This method stacks the featureData from each list element. Metadata columns in the GRanges object include physical position ('position'), a SNP indicator ('isSnp'), and the chromosome. The genome build is extracted from object using the method `genomeBuild`.

Author(s)
R. Scharpf

See Also
`oligoSetList, BeadStudioSetList`

Examples
`showClass("gSetList")`

---

### i2p

*Functions to convert probabilities to integers, or integers to probabilities.*

**Usage**

- `i2p(i)`
- `p2i(p)`

**Arguments**

- `i` A matrix or vector of integers.
- `p` A matrix or vector of probabilities.

**Value**

The value returned by `i2p` is

\[
1 - \exp(-i/1000)
\]

The value returned by `p2i` is

\[
\text{as.integer}(-1000*\log(1-p))
\]

Description

Probabilities estimated in the `crlmm` package are often stored as integers to save memory. We provide a few utility functions to go back and forth between the probability and integer representations.
**initializeBigMatrix**

**Initialize big matrices/vectors.**

**Description**

Initialize big matrices or vectors appropriately (conditioned on the status of support for large datasets - see Details).

**Usage**

```r
initializeBigMatrix(name=basename(tempfile()), nr=0L, nc=0L, vmode = "integer", initdata = NA)
initializeBigVector(name=basename(tempfile()), n=0L, vmode = "integer",
                   initdata = NA)
initializeBigArray(name=basename(tempfile()), dim=c(0L,0L,0L),
                   vmode="integer", initdata=NA)
```

**Arguments**

- `name`: prefix to be used for file stored on disk
- `nr`: number of rows
- `nc`: number of columns
- `n`: length of the vector
- `vmode`: mode - "integer", "double"
- `initdata`: Default is NA
- `dim`: Integer vector indicating the dimensions of the array to initialize

**Details**

These functions are meant to be used by developers. They provide means to appropriately create big vectors or matrices for packages like oligo and crlmm (and friends). These objects are created conditioned on the status of support for large datasets.

**Value**

If the 'ff' package is loaded (in the search path), then an 'ff' object is returned. A regular R vector or array is returned otherwise.

---

**See Also**

`confs`

**Examples**

```r
i2p(693)
p2i(0.5)
i2p(p2i(0.5))
```
Examples

```r
x <- initializeBigVector("test", 10)
class(x)
x
if (isPackageLoaded("ff"))
  finalizer(x) <- "delete"
rm(x)
initializeBigMatrix(nr=5L, nc=5L)
initializeBigArray(dim=c(10, 5, 3))
```

---

**integerMatrix**

Coerce numeric matrix (or array) to a matrix (array) of integers, retaining dimnames.

**Description**

Coerce numeric matrix to matrix of integers, retaining dimnames.

**Usage**

```r
integerMatrix(x, scale = 100)
integerArray(x, scale=100)
```

**Arguments**

- `x`: a matrix or array
- `scale`: scalar (numeric). If not 1, `x` is multiplied by `scale` prior to coercing to a matrix of integers.

**Value**

A matrix or array of integers.

**Author(s)**

R. Scharpf

**Examples**

```r
x <- matrix(rnorm(10), 5, 2)
rownames(x) = letters[1:5]
i <- integerMatrix(x, scale=100)
```
is.ffmatrix

Check if object is an ff-matrix object.

Description
Check if object is an ff-matrix object.

Usage
is.ffmatrix(object)

Arguments
object object to be checked

Value
Logical.

Note
This function is meant to be used by developers.

Examples
if (isPackageLoaded("ff")){
  x1 <- ff(vmode="double", dim=c(10, 2))
  is.ffmatrix(x1)
}
x1 <- matrix(0, nr=10, nc=2)
is.ffmatrix(x1)

isPackageLoaded
Check if package is loaded.

Description
Checks if package is loaded.

Usage
isPackageLoaded(pkg)

Arguments
pkg Package to be checked.
Details

Checks if package name is in the search path.

Value

Logical.

See Also

search

Examples

isPackageLoaded("oligoClasses")

isPackageLoaded("ff")

isPackageLoaded("snow")

Methods

Return an indicator for whether the marker is polymorphic (value 1) or nonpolymorphic (value 0).

Return an indicator for whether the vector of marker identifiers in object is polymorphic. pkgname must be one of the supported annotation packages specific to the platform.

signature(object = "character", pkgname = "character")

signature(object = "eSet", pkgname = "ANY")

If 'isSnp' is included in fvarLabels(object), an indicator for polymorphic markers is returned. Otherwise, an error is thrown.

signature(object = "GenomeAnnotatedDataFrame", pkgname = "ANY")

Accessor for indicator of whether the marker is polymorphic. If annotation was not available due to a missing or non-existent annotation package, the value returned by the accessor will be a vector of zero’s.
**kind**

<table>
<thead>
<tr>
<th>kind</th>
<th>Array type</th>
</tr>
</thead>
</table>

**Description**

Retrieves the array type.

**Usage**

```r
kind(object)
```

**Arguments**

- **object**: FeatureSet or DBPDInfo object

**Value**

String: "Expression", "Exon", "SNP" or "Tiling"

**Examples**

```r
if (require(pd.mapping50k.xba240)){
  data(sfsExample)
  Biobase::annotation(sfsExample) <- "pd.mapping50k.xba240"
  kind(sfsExample)
}
```

**ldSetOptions**

**Set/check large dataset options.**

**Description**

Set/check large dataset options.

**Usage**

```r
ldSetOptions(nsamples=100, nprobesets=20000, path=getwd(), verbose=FALSE)
ldStatus(verbos=FALSE)
ldPath(path)
```

**Arguments**

- **nsamples**: number of samples to be processed at once.
- **nprobesets**: number of probesets to be processed at once.
- **path**: path where to store large dataset objects.
- **verbose**: verbosity (logical).
Details

Some functions in oligo/crlmm can process data in batches to minimize memory footprint. When using this feature, the 'ff' package resources are used (and possibly combined with cluster resources set in options() via 'snow' package).

Methods that are executed on a sample-by-sample manner can use ocSamples() to automatically define how many samples are processed at once (on a compute node). Similarly, methods applied to probesets can use ocProbesets(). Users should set these options appropriately.

ldStatus checks the support for large datasets.
ldPath checks where ff files are stored.

Author(s)

Benilton S Carvalho

See Also

ocSamples, ocProbesets

Examples

ldStatus(TRUE)

| length-methods | Number of samples for FeatureSet-like objects. |

Description

Number of samples for FeatureSet-like objects.

Methods

x = "FeatureSet" Number of samples

library2 Supress package startup messages when loading a library

Description

Supress package startup messages when loading a library

Usage

library2(...)

library2 Supress package startup messages when loading a library
list.celfiles

Arguments

... arguments to library

Author(s)
R. Scharpf

See Also
library

Examples

library2("Biobase")

Description
Function used to get a list of CEL files.

Usage

list.celfiles(..., listGzipped=FALSE)

Arguments

... Passed to list.files
listGzipped Logical. List .CEL.gz files?

Value
Character vector with filenames.

Note
Quite often users want to use this function to pass filenames to other methods. In this situations, it is safer to use the argument 'full.names=TRUE'.

See Also
list.files
Examples

```r
if (require(hapmapsnp5)){
  path <- system.file("celFiles", package="hapmapsnp5")

  ## only the filenames
  list.celfiles(path)

  ## the filenames with full path...
  ## very useful when genotyping samples not in the working directory
  list.celfiles(path, full.names=TRUE)
} else{
  ## this won't return anything
  ## if in the working directory there isn't any CEL
  list.celfiles(getwd())
}
```

---

**ListClasses**

* eSetList class

**Description**

Initialization method for eSetList virtual class.

---

**locusLevelData**

*Basic data elements required for the HMM*

**Description**

This object is a list containing the basic data elements required for the HMM

**Usage**

```r
data(locusLevelData)
```

**Format**

A list

**Details**

The basic assay data elements that can be used for fitting the HMM are:

1. a mapping of platform identifiers to chromosome and physical position
2. (optional) a matrix of copy number estimates
3. (optional) a matrix of confidence scores for the copy number estimates (e.g., inverse standard deviations)
4. (optional) a matrix of genotype calls
5. (optional) CRLMM confidence scores for the genotype calls

At least (2) or (4) is required. The locusLevelData is a list that contains (1), (2), (4), and (5).
Source

A HapMap sample on the Affymetrix 50k platform. Chromosomal alterations were simulated. The last 100 SNPs on chromosome 2 are, in fact, a repeat of the first 100 SNPs on chromosome 1 – this was added for internal use.

Examples

```r
data(locusLevelData)
str(locusLevelData)
```

---

makeFeatureGRanges  *Construct a GRanges object from several possible feature-level classes*

Description

Construct a GRanges object from several possible feature-level classes. The conversion is useful for subsequent ranged-data queries, such as `findOverlaps`, `countOverlaps`, etc.

Usage

```r
makeFeatureGRanges(object, ...)
```

Arguments

- **object**: A `gSet`-derived object containing chromosome and physical position for the markers on the array.
- **...**: See the `makeFeatureGRanges` method for `GenomeAnnotatedDataFrame`.

Value

A `GRanges` object.

Author(s)

R. Scharpf

See Also

`findOverlaps`, `GRanges`, `GenomeAnnotatedDataFrame`

Examples

```r
library(oligoClasses)
library(GenomicRanges)
library(Biobase)
library(foreach)
registerDoSEQ()
data(oligoSetExample, package="oligoClasses")
oligoSet <- oligoSet[chromosome(oligoSet) == 1, ]
makeFeatureGRanges(oligoSet)
```
**ocLapply**

**Description**

ocLapply is an `lapply`-like function that checks if `ff/snow` are loaded and if the cluster variable is set to execute `FUN` on a cluster. If these requirements are not available, then `lapply` is used.

**Usage**

```r
ocLapply(X, FUN, ..., neededPkgs)
```

**Arguments**

- `X` first argument to `FUN`.
- `FUN` function to be executed.
- `...` additional arguments to `FUN`.
- `neededPkgs` packages needed to execute `FUN` on the compute nodes.

**Details**

`neededPkgs` is needed when parallel computing is expected to be used. These packages are loaded on the compute nodes before the execution of `FUN`.

**Value**

A list of length `length(X)`.

**Author(s)**

Benilton S Carvalho

**See Also**

`lapply`, `parStatus`
Description

Tools to simplify management of clusters via ‘snow’ package and large dataset handling through the ‘bigmemory’ package.

Usage

```
ocSamples(n)
ocProbesets(n)
```

Arguments

- `n` integer representing the maximum number of samples/probesets to be processed simultaneously on a compute node.

Details

Some methods in the oligo/crlmm packages, like `backgroundCorrect`, `normalize`, `summarize` and `rma` can use a cluster (set through the ‘foreach’ package). The use of cluster features is conditioned on the availability of the ‘ff’ (used to provide shared objects across compute nodes) and ‘foreach’ packages.

To use a cluster, ‘oligo/crlmm’ checks for three requirements: 1) ‘ff’ is loaded; 2) an adaptor for the parallel backend (like ‘doMPI’, ‘doSNOW’, ‘doMC’) is loaded and registered.

If only the ‘ff’ package is available and loaded (in addition to the caller package - ‘oligo’ or ‘crlmm’), these methods will allow the user to analyze datasets that would not fit in RAM at the expense of performance.

In the situations above (large datasets and cluster), oligo/crlmm uses the options `ocSamples` and `ocProbesets` to limit the amount of RAM used by the machine(s). For example, if `ocSamples` is set to 100, steps like background correction and normalization process (in RAM) 100 samples simultaneously on each compute node. If `ocProbesets` is set to 10K, then summarization processes 10K probesets at a time on each machine.

Warning

In both scenarios (large dataset and/or cluster use), there is a penalty in performance because data are written to disk (to either minimize memory footprint or share data across compute nodes).

Author(s)

Benilton Carvalho
Examples

```r
if(require(doMC)) {
    registerDoMC()
    ## tasks like summarize()
}
```

---

**oligoSet**  
*An example instance of oligoSnpSet class*

---

Description

An example instance of the `oligoSnpSet` class

Usage

```r
data(oligoSetExample)
```

Source

Created from the simulated `locusLevelData` provided in this package.

See Also

`locusLevelData`

Examples

```r
## Not run:
## 'oligoSetExample' created by the following
data(locusLevelData)
oligoSet <- new("oligoSnpSet",
copyNumber=integerMatrix(log2(locusLevelData[["copynumber"]]/100), 100),
call=locusLevelData[["genotypes"]],
callProbability=locusLevelData[["crlmmConfidence"]],
annotation=locusLevelData[["platform"]],
genome="hg19")
oligoSet <- oligoSet[!is.na(chromosome(oligoSet)), ]
oligoSet <- oligoSet[chromosome(oligoSet) < 3, ]

## End(Not run)
data(oligoSetExample)
oligoSet
```
Methods for oligoSnpSet class

Methods

In the following code, object is an instance of the oligoSnpSet class.

`new("oligoSnpSet", ...)`: Instantiates an object of class oligoSnpSet. The assayData elements of the oligoSnpSet class can include matrices of genotype calls, confidence scores for the genotype calls, B allele frequencies, absolute or relative copy number, and confidence scores for the copy number estimates. Each matrix should be coerced to an integer scale prior to assignment to the oligoSnpSet object. Validity methods defined for the class will fail if the matrices are not integers. See examples for additional details.

`baf(object)`: Accessor for integer representation of the B allele frequencies. The value returned by this method can be divided by 1000 to obtain B allele frequencies on the original [0,1] scale.

`baf(object) <- value`: Assign an integer representation of the B allele frequencies to the 'baf' element of the assayData slot. value must be a matrix of integers. See the examples for help converting BAFs to a matrix of integers.

parStatus

Checks if oligo/crlmm can use parallel resources.

Description

Checks if oligo/crlmm can use parallel resources (needs ff and snow package, in addition to options(cluster=makeCluster(...)).

Usage

parStatus()

Value

logical

Author(s)

Benilton S Carvalho
pdPkgFromBioC  

Get packages from BioConductor.

Description

This function checks if a given package is available on BioConductor and installs it, in case it is.

Usage

pdPkgFromBioC(pkgname, lib = .libPaths()[1], verbose = TRUE)

Arguments

pkgname  character. Name of the package to be installed.
lib  character. Path where to install the package at.
verbose  logical. Verbosity flag.

Details

Internet connection required.

Value

Logical: TRUE if package was found, downloaded and installed; FALSE otherwise.

Author(s)

Benilton Carvalho

See Also

download.packages

Examples

```r
## Not run:
pdPkgFromBioC("pd.mapping50k.xba240")

## End(Not run)
```
Description
Platform Information

Methods

object = "FeatureSet"  platform information

pmFragmentLength-methods
Information on Fragment Length

Description
This method will return the fragment length for PM probes.

Methods

object = "AffySNPPDInfo"  On AffySNPPDInfo objects, it will return the fragment length that contains the SNP in question.

position-methods
Methods for function position in Package oligoClasses

Description
Methods for function position in package oligoClasses

Methods
The methods for position extracts the physical position stored as an integer for each marker in a eSet-derived class or a AnnotatedDataFrame-derived class.

signature(object = "AnnotatedDataFrame")  Accessor for physical position.
signature(object = "eSet")  If 'position' is included in fvarLabels(object), the physical position will be returned. Otherwise, an error is thrown.
signature(object = "GenomeAnnotatedDataFrame")  Accessor for physical position. If annotation was not available due to a missing or non-existent annotation package, the value returned by the accessor will be a vector of zero's.
Helper function to load packages.

This function checks the existence of a given package and loads it if available. If the package is not available, the function checks its availability on BioConductor, downloads it and installs it.

Usage

requireAnnotation(pkgname, lib=.libPaths()[1], verbose = TRUE)

Arguments

pkgname character. Package name (usually an annotation package).
lib character. Path where to install packages at.
verbose logical. Verbosity flag.

Value

Logical: TRUE if package is available or FALSE if package unavailable for download.

Author(s)

Benilton Carvalho

See Also

install.packages

Examples

## Not run:
requirePackage("pd.mapping50k.xba240")

## End(Not run)
Description

Package loaders for clusters.

Usage

requireClusterPkgSet(packages)
requireClusterPkg(pkg, character.only)

Arguments

packages character vector with the names of the packages to be loaded on the compute nodes.
pkg name of a package given as a name or literal character string
character.only a logical indicating whether ‘pkg’ can be assumed to be a character string

Details

requireClusterPkgSet applies require for a set of packages on the cluster nodes.
requireClusterPkg applies require for *ONE* package on the cluster nodes and accepts every argument taken by require.

Value

Logical.

Author(s)

Benilton S Carvalho

See Also

require

Documentation for FeatureSet-like objects

Description

Returns sample names for FeatureSet-like objects.

Methods

object = "FeatureSet"  Sample names
**Description**

Example of SnpCnvQSet object.

**Usage**

```r
data(scqsExample)
```

**Format**

Object belongs to SnpCnvQSet class.

**Examples**

```r
data(scqsExample)
class(scqsExample)
```

---

**Description**

*DEPRECATED FUNCTIONS. Cluster and large dataset management utilities.*

Tools to simplify management of clusters via 'snow' package and large dataset handling through the 'bigmemory' package.

**Usage**

```r
setCluster(...) getCluster() delCluster()
```

**Arguments**

... arguments to be passed to makeCluster in the 'snow' package.
Details

Some methods in the oligo/crlmm packages, like backgroundCorrect, normalize, summarize and rma can use a cluster (set through 'snow' package). The use of cluster features is conditioned on the availability of the 'bigmemory' (used to provide shared objects across compute nodes) and 'snow' packages.

To use a cluster, 'oligo/crlmm' checks for three requirements: 1) 'ff' is loaded; 2) 'snow' is loaded; and 3) the 'cluster' option is set (e.g., via options(cluster=makeCluster(...)) or setCluster(...)).

If only the 'ff' package is available and loaded (in addition to the caller package - 'oligo' or 'crlmm'), these methods will allow the user to analyze datasets that would not fit in RAM at the expense of performance.

In the situations above (large datasets and cluster), oligo/crlmm uses the options ocSamples and ocProbesets to limit the amount of RAM used by the machine(s). For example, if ocSamples is set to 100, steps like background correction and normalization process (in RAM) 100 samples simultaneously on each compute node. If ocProbesets is set to 10K, then summarization processes 10K probesets at a time on each machine.

Warning

In both scenarios (large dataset and/or cluster use), there is a penalty in performance because data are written to disk (to either minimize memory footprint or share data across compute nodes).

Author(s)

Benilton Carvalho

---

**sfsExample**  
*SnpFeatureSet Example*

Description

Example of SnpFeatureSet object.

Usage

data(sfsExample)

Format

Object belongs to SnpFeatureSet class

Examples

data(sfsExample)
class(sfsExample)
Accessors and methods for SnpSet objects

Description

Utility functions for accessing data in SnpSet objects.

Usage

calls(object)
calls(object) <- value
conds(object, transform=TRUE)
conds(object) <- value

Arguments

object A SnpSet object.
transform Logical. Whether to transform the integer representation of the confidence score (for memory efficiency) to a probability. See details.
value A matrix.

Details

calls returns the genotype calls. CRLMM stores genotype calls as integers (1 - AA; 2 - AB; 3 - BB).

confs returns the confidences associated with the genotype calls. The current implementation of CRLMM stores the confidences as integers to save memory on disk by using the transformation: round(-1000*log2(1-p)),

where 'p' is the posterior probability of the call. confs is a convenience function that transforms the integer representation back to a probability. Note that if the assayData elements of the SnpSet objects are ff_matrix or ffdf, the confs function will return a warning. For such objects, one should first subset the ff object and coerce to a matrix, then apply the above conversion. The function snpCallProbability for the callProbability slot of SnpSet objects. See the examples below.

checkOrder checks whether the object is ordered by chromosome and physical position, evaluating to TRUE or FALSE.

Note

Note that the replacement method for confs<- expects a matrix of probabilities and will automatically convert the probabilities to an integer representation. See details for the conversion.

The accessor snpCallProbability is an accessor for the 'callProbability' element of the assayData. The name can be misleading, however, as the accessor will not return a probability if the call probabilities are represented as integers.
See Also

The helper functions \texttt{p2i} converts probabilities to integers and \texttt{i2p} converts integers to probabilities. See \texttt{order} and \texttt{checkOrder}.

Examples

```r
theCalls <- matrix(sample(1:3, 20, rep=TRUE), nc=2)
p <- matrix(runif(20), nc=2)
integerRepresentation <- matrix(as.integer(round(-1000*log(1-p))), 10, 2)
obj <- new("SnpSet2", call=theCalls, callProbability=integerRepresentation)
calls(obj)
  confs(obj) ## coerces to probability scale
  int <- Biobase::snpCallProbability(obj) ## not necessarily a probability
  p3 <- i2p(int) ## to convert back to a probability
```

Description

A container for genotype calls and confidence scores. Similar to the \texttt{SnpSet} class in \texttt{Biobase}, but \texttt{SnpSet2} extends \texttt{gSet} directly whereas \texttt{SnpSet} extends \texttt{eSet}. Useful properties of \texttt{gSet} include the genome slot and the GenomeAnnotatedDataFrame.

Objects from the Class

Objects can be created by calls of the form \texttt{new("SnpSet2", assayData, phenoData, featureData, experimentData, annotation, protocolData, call, callProbability, genome, \ldots)}.

Slots

- \texttt{genome}: Object of class "character" indicating the UCSC genome build. Supported builds are 'hg18' and 'hg19'.
- \texttt{assayData}: Object of class "AssayData".
- \texttt{phenoData}: Object of class "AnnotatedDataFrame".
- \texttt{featureData}: Object of class "AnnotatedDataFrame".
- \texttt{experimentData}: Object of class "MIAxE".
- \texttt{annotation}: Object of class "character" ~
- \texttt{protocolData}: Object of class "AnnotatedDataFrame" ~
- \texttt{__.classVersion__.}: Object of class "Versions" ~

Extends

Class "\texttt{gSet}". directly. Class "\texttt{eSet}". by class "\texttt{gSet}". distance 2. Class "\texttt{VersionedBiobase}". by class "\texttt{gSet}". distance 3. Class "\texttt{Versioned}". by class "\texttt{gSet}". distance 4.
Accessors

The argument object for the following methods is an instance of the SnpSet2 class.

calls(object): calls(object) <- value:
   Gets or sets the genotype calls. value can be a matrix or a ff_matrix.
confs(object): confs(object) <- value:
   Gets or sets the genotype confidence scores. value can be a matrix or a ff_matrix.
snpCall(object): snpCallProbability(object) <- value:
   Gets or sets the genotype confidence scores.

Author(s)

R. Scharpf

See Also

SnpSet

Examples

showClass("SnpSet2")
new("SnpSet2")

SnpSuperSet-class  Class "SnpSuperSet"

Description

A class to store locus-level summaries of the quantile normalized intensities, genotype calls, and genotype confidence scores

Objects from the Class

new("SnpSuperSet", alleleA=alleleA, alleleB=alleleB, call=call, callProbability, ...).

Slots

assayData: Object of class "AssayData"~~
phenoData: Object of class "AnnotatedDataFrame"~~
featureData: Object of class "AnnotatedDataFrame"~~
experimentData: Object of class "MIAME"~~
annotation: Object of class "character"~~
protocolData: Object of class "AnnotatedDataFrame"~~
__classVersion__: Object of class "Versions"~~
splitIndicesByLength

**Description**

Tools to distribute objects across nodes or by length.

**Usage**

```r
splitIndicesByLength(x, lg, balance=FALSE)
splitIndicesByNode(x)
```

**Arguments**

- `x` object to be split
- `lg` length
- `balance` logical. Currently ignored

**Details**

- `splitIndicesByLength` splits `x` in groups of length `lg`.
- `splitIndicesByNode` splits `x` in `N` groups (where `N` is the number of compute nodes available).
Value

List.

Author(s)

Benilton S Carvalho

See Also

split

Examples

```r
x <- 1:100
splitIndicesByLength(x, 8)
splitIndicesByLength(x, 8, balance=TRUE)
splitIndicesByNode(x)
```

---

**Description**

Example of SnpQSet instance.

**Usage**

```r
data(sqsExample)
```

**Format**

Belongs to SnpQSet class.

**Examples**

```r
data(sqsExample)
class(sqsExample)
```
Methods for RangedSummarizedExperiment objects

Description

Methods for RangedSummarizedExperiment.

Usage

```r
## S4 method for signature 'RangedSummarizedExperiment'
baf(object)
## S4 method for signature 'RangedSummarizedExperiment'
chromosome(object,...)
## S4 method for signature 'RangedSummarizedExperiment'
isSnp(object, ...)
## S4 method for signature 'RangedSummarizedExperiment'
lrr(object)
```

Arguments

- `object`: A `RangedSummarizedExperiment` object.
- `...`: ignored

Details

- `baf` and `lrr` are accessors for the B allele frequencies and log R ratio assays (matrices or arrays), respectively.
- `chromosome` returns the seqnames of the rowRanges.
- `isSnp` returns a logical vector for each marker in `rowRanges` indicating whether the marker targets a SNP (nonpolymorphic regions are FALSE).

See Also

- `RangedSummarizedExperiment`
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