Package ‘oligoClasses’

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

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Imports BiocGenerics (>= 0.3.2), Biobase (>= 2.17.8), methods, graphics, IRanges (>= 2.5.17), GenomicRanges (>= 1.23.7), SummarizedExperiment, Biostrings (>= 2.23.6), affyio (>= 1.23.2), ff, foreach, BiocInstaller, utils, S4Vectors (>= 0.9.25), RSQLite

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


biocViews Infrastructure

## Local Variables

## time-stamp-pattern `\8/Date: %3a %3b %2d %02H:%02M:%02S %Z %:%y/{ }\n`
## End

NeedsCompilation no

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Available Affymetrix platforms for SNP arrays

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
AlleleSet-class

Examples

```r
affyPlatforms()
```

---

**AlleleSet-class**

**Class** "AlleleSet"

---

**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"

**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

```r
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

AssayData-methods

**Methods for class AssayData in the oligoClasses package**

**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**

1M: 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.
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
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)
```

assayDataList-methods  Accessor for slot assayDataList in Package oligoClasses

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 surrogates 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

```r
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**

**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.

**Author(s)**

R. Scharpf
**Examples**

```r
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**

```r
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**

```r
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.
```

```r
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
**celfileDate**

**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**

```r
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

```r
## 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

```r
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 indicaged 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.
checkOrder

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)
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)
```

Description

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

Usage

```r
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

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

Note

Integer representation: chr X = 23, chr Y = 24, chr XY = 25. Symbols M, Mt, and MT are coded as 26.
chromosome2integer

Converts chromosome to integer

Description

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

Usage

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

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

CNSet-class

Class "CNSet"

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"))
```

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 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.
new("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")
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

```r
cnset <- new("CopyNumberSet")
ls(Biobase::assayData(cnset))
```

Description

Accessors and `CopyNumberSet`

Usage

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

Arguments

- `object` CopyNumberSet object or derived class
- `...` Ignored for CopyNumberSet and oligoSnpSet.
- `value` matrix
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

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
genomeBuild(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)

---

**DBPDInfo-class**  

**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
**Description**

Example of ExpressionFeatureSet Object.

**Usage**

data(efsExample)

**Format**

Object belongs to ExpressionFeatureSet class.

**Examples**

data(efsExample)
class(efsExample)

---

### exprs-methods

**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

**Description**

Accessor for slot `featureDataList` in Package `oligoClasses` ~

**Methods**

- `signature(object = "gSetList")` An object inheriting from class gSetList.
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)
ffdf-class  

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.

ff_matrix-class  

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
flags

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))
generics

Miscellaneous generics. Methods defined in packages that depend on oligoClasses

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

See Also

AnnotatedDataFrame

Examples

new("GenomeAnnotatedDataFrame")
if(require("pd.mapping50k.hind240") && require("pd.mapping50k.xba240") && require("SNPchip")){
data(locusLevelData)
gd <- GenomeAnnotatedDataFrameFrom(locusLevelData["genotypes"],
   annotationPkg=locusLevelData["platform"],
   genome="hg19")
   arm <- getArm(gd, "hg19")
}
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)
chr(gd)
pos(gd)
}
```

genomeBuild

---

### Genome Build Information

**Description**

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

**Usage**

```r
geneBuildd(object)
```

**Arguments**

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

**Value**

character string

**Note**

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

**Examples**

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

*Array Geometry Information*

**Description**

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

**Usage**

```r
geometry(object)
```

**Arguments**

- `object` PDInfo or FeatureSet object

**Examples**

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

---

**getA**

*Compute average log-intensities / log-ratios*

**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):

- `antisenseThetaA` antisense allele A. (Not applicable for Affymetrix 5.0 and 6.0 platforms.)
- `antisenseThetaB` antisense allele B. (Not applicable for Affymetrix 5.0 and 6.0 platforms.)
- `senseThetaA` sense allele A. (Not applicable for Affymetrix 5.0 and 6.0 platforms.)
- `senseThetaB` sense allele B. (Not applicable for Affymetrix 5.0 and 6.0 platforms.)
- `alleleA` Affymetrix 5.0 and 6.0 platforms
getBar

- alleleBAfymetrix 5.0 and 6.0 platforms

The average log-intensities are given by: \( \frac{\text{antisenseThetaA} + \text{antisenseThetaB}}{2} \) and \( \frac{\text{senseThetaA} + \text{senseThetaB}}{2} \).

The average log-ratios are given by: \( \frac{\text{antisenseThetaA} - \text{antisenseThetaB}}{2} \) and \( \frac{\text{senseThetaA} - \text{senseThetaB}}{2} \).

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

When large data support is enabled with the ff package, the AssayData elements of an AlleleSet object can be \text{ff_matrix} or \text{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

\text{snprma}

getBar

Gets a bar of a given length.

Description

Gets a bar of a given length.

Usage

getBar(width = getOption("width"))

Arguments

width
desired length of the bar.

Value

character string.

Author(s)

Benilton S Carvalho

Examples

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**

getSequenceLengths(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", "chr3"), c(1, 3, 2, 4)),
                 ranges = IRanges(1:10, width = 10:1, names = head(letters,10)),
                 strand = Rle(strand(c("-", "+", "*", "+", "-")),
                         c(1, 2, 2, 3, 2)),
                 score = 1:10,
                 GC = seq(1, 0, length=10),
                 seqlengths=sl)
  metadata(gr) <- list(genome="hg18")
  gr
  metadata(gr)
}
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)
gr1 <- GRanges(seqnames = "chr2", ranges = IRanges(3, 6), state=3L, numberProbes=100L)
## convenience functions
state(gr1)
numberProbes(gr1)

g2 <- GRanges(seqnames = c("chr1", "chr1"), ranges = IRanges(c(7,13), width = 3), state=c(2L, 2L), numberProbes=c(200L, 250L))
gSet-class

Container for objects with genomic annotation on SNPs

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 "MIaX"  
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.
**gSetList-class**

lab(object): database connection

getGenomeBuild(object), genomeBuild(object) <- value:

Get or set the UCSC genome build. Supported builds are hg18 and hg19.

getArm(object): Character vector 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.

**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" ~

gene: 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.

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.

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

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

**See Also**

- *confs*

**Examples**

- `i2p(693)`
- `p2i(0.5)`
- `i2p(p2i(0.5))`

---

**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.

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.
## kind

**Value**

Logical.

**See Also**

search

**Examples**

```r
isPackageLoaded("oligoClasses")
isPackageLoaded("ff")
isPackageLoaded("snow")
```

### isSnp-methods

**Methods for Function isSnp in package oligoClasses**

**Description**

Methods for function isSnp in package **oligoClasses**

**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

**Array type**

**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)
}
```

### Description

Set/check large dataset options.

### Usage

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

*Suppress package startup messages when loading a library*

Description

Suppress package startup messages when loading a library

Usage

library2(...)  

Arguments

...  arguments to library

Author(s)

R. Scharpf

See Also

library

Examples

library2("Biobase")
**list.celfiles**

*List CEL files.*

**Description**

Function used to get a list of CEL files.

**Usage**

```r
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)
}
```

**ListClasses**

*eSetList class*

**Description**

Initialization method for eSetList virtual class.
**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**

`makeFeatureGRanges(object, ...)`

---

**locusLevelData**

Basic data elements required for the HMM

**Description**

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

**Usage**

`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**

`data(locusLevelData)`

`str(locusLevelData)`
Arguments

object A gSet-derived object containing chromosome and physical position for the markers on the array.

Value

A GRanges object.

Author(s)

R. Scharpf

See Also

findOverlaps, GRanges, GenomeAnnotatedDataFrame

Examples

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

Description

Manufacturer ID for FeatureSet-like objects.

Methods

object = "FeatureSet" Manufacturer ID

object = "PDInfo" Manufacturer ID
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

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

ocSamples

Cluster and large dataset management utilities.

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

## 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

Description

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

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

### 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.

requireAnnotation

Helper function to load packages.

Description

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
requireClusterPkgSet

DEPRECATED FUNCTIONS. Package loaders for clusters.

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

Examples

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

## End(Not run)
sampleNames-methods  Sample names for FeatureSet-like objects

Description

Returns sample names for FeatureSet-like objects.

Methods

object = "FeatureSet"  Sample names

scqsExample  SnpCnvQSet Example

Description

Example of SnpCnvQSet object.

Usage

data(scqsExample)

Format

Object belongs to SnpCnvQSet class.

Examples

data(scqsExample)
class(scqsExample)

setCluster  DEPRECATED FUNCTIONS. Cluster and large dataset management utilities.

Description

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

Usage

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)
## SnpSet-methods

### Accessors and methods for SnpSet objects

#### Description

Utility functions for accessing data in SnpSet objects.

#### Usage

```r
calls(object)
calls(object) <- value
cons(object, transform=TRUE)
cons(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).

cons 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: \(\text{round}(-1000\times\log2(1-p))\), where ‘p’ is the posterior probability of the call. cons 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 cons 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 cons<- 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 p2i converts probabilities to integers and i2p converts integers to probabilities. See order and checkOrder.
Examples

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)
  cons(obj) ## coerces to probability scale
  int <- Biobase::snpCallProbability(obj) ## not necessarily a probability
  p3 <- i2p(int) ## to convert back to a probability

SnpSet2-class Class "SnpSet2"

Description

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

Objects from the Class

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

Slots

  genome: Object of class "character" indicating the UCSC genome build. Supported builds are
    'hg18' and 'hg19'.
  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 "gSet", directly. Class "eSet", by class "gSet", distance 2. Class "VersionedBiobase", by
class "gSet", distance 3. Class "Versioned", by class "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.
cons(object): cons(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.
SnpSuperSet-class

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" ~

Extends

Methods
No methods defined with class "SnpSuperSet" in the signature.

Author(s)
R. Scharpf

See Also
AlleleSet
splitIndicesByLength

Tools to distribute objects across nodes or by length.

Description
Tools to distribute objects across nodes or by length.

Usage
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
x <- 1:100
splitIndicesByLength(x, 8)
splitIndicesByLength(x, 8, balance=TRUE)
splitIndicesByNode(x)
Description

Example of SnpQSet instance.

Usage

data(sqsExample)

Format

Belongs to SnpQSet class.

Examples

data(sqsExample)
class(sqsExample)

summarizedexperiment-methods

Methods for RangedSummarizedExperiment objects

Description

Methods for RangedSummarizedExperiment.

Usage

## 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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