Package ‘oligoClasses’

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

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Depends R (>= 2.14)

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

Suggests hapmapsnp5, hapmapsnp6, pd.genomewidesnp.6,
pd.genomewidesnp.5, pd.mapping50k.hind240,
pd.mapping50k.xba240, pd.mapping250k.sty, pd.mapping250k.nsp,
genomewidesnp6Crlmm (>= 1.0.7), genomewidesnp5Crlmm (>= 1.0.6),
RUnit, human370v1cCrlmm, SNPchip, VanillaICE, crlmm

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

License GPL (>= 2)

LazyLoad yes

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methods-AlleleSet.R methods-AnnotatedDataFrame.R
methods-FeatureSet.R methods-AssayData.R
methods-SnpFeatureSet.R methods-oligoSnpSet.R
methods-CopyNumberSet.R methods-CNSet.R methods-PDInfo.R
methods-RangedDataCNV.R methods-SnpSet.R
methods-GenomeAnnotatedDataFrame.R methods-BeadStudioSet.R
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biocViews Infrastructure

## Local Variables

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### affyPlatforms

#### Available Affymetrix platforms for SNP arrays

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### Description

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

### Usage

```r
affyPlatforms()
```

### Value

A vector of class character.

### Author(s)

R. Scharpf
AlleleSet-class

Examples

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
annotationPackages

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

**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**

- **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.
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
assayDataList-methods

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 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

```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**

`batchStatistics` 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.

Author(s)
R. Scharpf
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
**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**

```r
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**

```r
celfileName(object)
```

**Arguments**

- `object` An object of class CNSet

**Value**

Character string vector.
checkExists

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.
checkOrder

Author(s)
R. Scharpf

Examples
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)

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

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

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

Converts chromosome to integer

Description

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

Usage

chromosome2integer(chrom)
integer2chromosome(intChrom)

Arguments

crom    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")))

CNSSet-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
  ```r
  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
  ```r
  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")`

**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

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

---

**CopyNumberSet**-methods  Methods for class CopyNumberSet.

### Description

Accessors and CopyNumberSet

### Usage

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

### Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>object</td>
<td>CopyNumberSet object or derived class</td>
</tr>
<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

library(Biobase)
data(locusLevelData)
path <- system.file("extdata", package="oligoClasses")
fd <- readRDS(file.path(path, "genomeAnnotatedDataFrameExample.rds"))
## the following command creates an 'oligoSnpsSet' 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("oligoSnpsSet",
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 oligoSnpsSet 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**

```r
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`

---

```r
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**

```r
db(object)
```

**Arguments**

- `object`: Object of valid class. See methods.

**Value**

SQLite connection.
**Methods**

```R
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**

```R
## 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
**FeatureDataList-methods**

---

**EfsExample**

*ExpressionFeatureSet Object*

---

**Description**

Example of ExpressionFeatureSet Object.

**Usage**

```r
data(efsExample)
```

**Format**

Object belongs to ExpressionFeatureSet class.

**Examples**

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

---

**Exprs-methods**

*Accessor for the ‘exprs’ slot*

---

**Description**

Accessor for the ‘exprs’/‘se.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 aSet
- `object = "SnpSet"` General container ‘exprs’ inherited from aSet, not yet used.

---

**FeatureDataList-methods**

*Accessor for slot FeatureDataList in Package oligoClases ~*

---

**Description**

Accessor for slot FeatureDataList in Package oligoClases ~

**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")
**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))
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

require(Biobase)
minReqVersion <- "1.0.2"
require(human370v1cCrlmm)
if (packageDescription("human370v1cCrlmm", fields="/quotesingle.Var
version/" 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.

Value

character string

Note

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

Examples

showMethods("genomeBuild", where="package:oligoClasses")
**geometry**  
*Array Geometry Information*

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

**Usage**  
`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**  
```
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

- alleleBAffymetrix 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: \( \text{antisenseThetaA} - \text{antisenseThetaB} \) and \( \text{senseThetaA} - \text{senseThetaB} \).

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

When large data support is enabled with the ff package, the AssayData elements of an AlleleSet object can be 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

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", "chr1", "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

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.

geneBuild(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)

gr2 <- GRanges(seqnames = c("chr1", "chr1"),
ranges = IRanges(c(7,13), width = 3),
state=c(2L, 2L), numberProbes=c(200L, 250L))
gr3 <- 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
gr1 <- GRangesList("sample1" = gr1, "sample2" = gr2, "sample3" = gr3)
sampleNames(gr1) ## same as names(gr1)
numberProbes(gr1)
chromosome(gr1)
state(gr1)
gr <- stack(gr1)
sampleNames(gr)
chromosome(gr)
state(gr)

---

### 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 "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.
Virtual Class for Lists of eSets

Author(s)

R. Scharpf

See Also

chromosome, position, isSnp

Examples

showClass("gSet")
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)
initializeBigMatrix

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 `2pi` 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

```
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
integerMatrix

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)
ingterArray(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")

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

kind(object)

Arguments

object FeatureSet or DBPDInfo object
ldSetOptions

Setting/check large dataset options.

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(ordered=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

1dStatus(TRUE)

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(...)
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)
} 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
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)

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, ...)

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

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

lapply-like function that parallelizes code when possible.

**Description**

ocLapply is an lapply-like function that checks if fl/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

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

oligoSnpSet-methods

Methods for oligoSnpSet class

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)

platform-methods Platform Information

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.
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.

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
Examples

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

Description

Package loaders for clusters.

Usage

```r
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`
**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**

```r
data(scqsExample)
```

**Format**
Object belongs to SnpCnvQSet class.

**Examples**

```r
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**

```r
setCluster(...)  
getCluster()  
deCluste()`
```

**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

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
confs(object, transform=TRUE)
confs(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 p2i converts probabilities to integers and i2p converts integers to probabilities. See order and checkOrder.
Examples

```r
calls <- 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=calls, 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
```

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 "MIARX".
- **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.
- **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.
**SnpSuperSet-class**

**Author(s)**
R. Scharpf

**See Also**

*SnpSet*

**Examples**

```r
showClass("SnpSet2")
new("SnpSet2")
```

---

**Description**

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

**Objects from the Class**


**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*
Examples

```
showClass("SnpSuperSet")
## empty object from the class
x <- new("matrix")
new("SnpSuperSet", alleleA=x, alleleB=x, call=x, callProbability=x)
```

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)
```
sqsExample

sqsExample  SnpQSet Example

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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