

oligoClasses

October 25, 2011

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**

```
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)
```

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):

- antisenseThetaAntisense allele A. (Not applicable for Affymetrix 5.0 and 6.0 platforms.)
- antisenseThetaBantisense allele B. (Not applicable for Affymetrix 5.0 and 6.0 platforms.)
- senseThetaAsense allele A. (Not applicable for Affymetrix 5.0 and 6.0 platforms.)
- senseThataBsense allele B. (Not applicable for Affymetrix 5.0 and 6.0 platforms.)
- alleleAAffymetrix 5.0 and 6.0 platforms
- alleleBAffymetrix 5.0 and 6.0 platforms

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

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: $M = \log_2(\text{channel1}) - \log_2(\text{channel2})$ $A = (\log_2(\text{channel1}) + \log_2(\text{channel2})) / 2$

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](#)

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 $\log_2(A)$ and $\log_2(B)$ intensities.

nu: The intercept for the linear model. The linear model is fit to the A and B alleles independently.

phi: The slope for the linear model. The linear model is fit independently to the A and B alleles.

See Also[CNSet-class](#)**Examples**

```

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)))
isCurrent(test1)
assayDataElementNames(batchStatistics(test1))
## Accessors for linear model parameters
## -- Included here primarily as a check that accessors are working
## -- Values are all NA until CN estimation is performed using the crlmm package
##
## subsetting
test1[1:10, 1:5]
## names of elements in the object
## accessors for parameters
nu(test1, "A")[1:10, ]
nu(test1, "B")[1:10, ]
phi(test1, "A")[1:10, ]
phi(test1, "B")[1:10, ]

```

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.

```

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

```

Slots

```

batch: Object of class "factor" ~~
batchStatistics: Object of class "AssayData" ~~
assayData: Object of class "AssayData" ~~
phenoData: Object of class "AnnotatedDataFrame" ~~
featureData: Object of class "AnnotatedDataFrame" ~~
experimentData: Object of class "MIAME" ~~
annotation: Object of class "character" ~~
protocolData: Object of class "AnnotatedDataFrame" ~~
.___classVersion__: Object of class "Versions" ~~

```

Extends

Class "[SnpSet](#)", directly. Class "[eSet](#)", by class "SnpSet", distance 2. Class "[VersionedBiobase](#)", by class "SnpSet", distance 3. Class "[Versioned](#)", by class "SnpSet", distance 4.

Methods

```
[ signature(x = "CNSet"):...
A signature(object = "CNSet"):...
A<- signature(object = "CNSet"):...
allele signature(object = "CNSet"):...
B signature(object = "CNSet"):...
B<- signature(object = "CNSet"):...
batch signature(object = "CNSet"):...
batchNames signature(object = "CNSet"):...
batchNames<- signature(object = "CNSet"):...
close signature(con = "CNSet"):...
coerce signature(from="CNSetLM"):...
coerce signature(from="CNSet"):...
corr signature(object = "CNSet", allele = "character"):...
flags signature(object="CNSet"): SNP flags
initialize signature(.Object = "CNSet"):...
nu signature(object = "CNSet", allele = "character"):...
open signature(con = "CNSet"):...
phi signature(object = "CNSet", allele = "character"):...
sigma2 signature(object = "CNSet", allele = "character"):...
tau2 signature(object = "CNSet", allele = "character"):...
```

Author(s)

R. Scharpf

See Also

[relocateObject](#)

Examples

```
if(require("genomewidesnp6Crlmm")){
require("genomewidesnp6Crlmm")
fns <- c("SNP_A-2131660", "SNP_A-1967418", "SNP_A-1969580", "SNP_A-4263484",
"SNP_A-1978185", "SNP_A-4264431", "SNP_A-1980898", "SNP_A-1983139",
"SNP_A-4265735", "SNP_A-1995832")
theCalls <- matrix(2, nc=2, nrow=10)
A <- matrix(sample(1:1000, 20), 10,2)
B <- matrix(sample(1:1000, 20), 10,2)
p <- matrix(runif(20), nc=2)
theConfs <- round(-1000*log2(1-p))
## Batch can be defined by the scan date of the array
```

```

##or the 96 well chemistry plate from which the
##samples were derived. Here we indicate that the two
##samples were from the same batch.
batch <- rep(factor(1), ncol(A))
## each parameter is a R x C matrix, where the number
## of rows (R) corresponds to the number of features
## and the number of columns (C) corresponds to the
## number of batches. In this toy example, the
## samples were assumed to be from the same batch.
## Ordinarily, one would have 50+ samples in a given
## batch.
dns <- list(fns, batch="1")
obj <- new("CNSet",
  alleleA=A,
  alleleB=B,
  call=theCalls,
  callProbability=theConfs,
  batch=as.character(rep(1, ncol(A))),
  annotation="genomewidesnp6")
assayDataElementNames(batchStatistics(obj))
featureNames(obj) <- fns
## Accessors
calls(obj)
confs(obj)
A(obj)
B(obj)
featureData(obj) <- addFeatureAnnotation(obj)
isSnp(obj)
chromosome(obj)
position(obj)
}

```

CopyNumberSet-methods

Methods for class CopyNumberSet.

Description

Accessors and CopyNumberSet

Usage

```

copyNumber(object, ...)
cnConfidence(object)

```

Arguments

object	CopyNumberSet object
...	Ignored for CopyNumberSet and oligoSnpSet. For CNSet, specification of the marker indices and/or column indices is required through arguments i and j, respectively.

Value

`copyNumber` returns a matrix of copy number estimates.

`cnConfidence` returns a matrix of confidence scores for the copy number estimates.

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

FeatureSet-class *"FeatureSet" and "FeatureSet" Extensions*

Description

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

Objects from the Class

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

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

Slots

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

Methods

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

Author(s)

Benilton Carvalho

See Also

[eSet](#), [VersionedBiobase](#), [Versioned](#)

Examples

```

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

geometry

Array Geometry Information

Description

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

Usage

```
geometry(object)
```

Arguments

`object` `PDInfo` object

Examples

```

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

Description

`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:

$$\text{round}(-1000 \cdot \log_2(1-p)),$$

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.

Methods

`initialize(SnpSet)`: Object instantiation, used by `new`; not to be called directly by the user.

`calls(object)`: accessor for genotype calls

`confs(object)`: accessor for `crlmm` genotype confidence scores

See Also

[addFeatureAnnotation](#), [snpCallProbability](#)

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("SnpSet", call=theCalls, callProbability=integerRepresentation)
calls(obj)
p2 <- confs(obj)
dimnames(p2) <- NULL
all.equal(p2, p) ## small differences due to rounding

## example using ff
if(require(ff)){
  ldPath(tempdir())
  integerRepresentation <- initializeBigMatrix("tmp", 10, 2)
  for(j in 1:2) integerRepresentation[, j] <- as.integer(round(-1000*log(1-p[, j])))
  integerRepresentation
  obj <- new("SnpSet", call=theCalls, callProbability=integerRepresentation)
  calls(obj)
  res <- tryCatch(confs(obj), error=function(e) NULL)
  is.null(res)
  integerRepresentation <- snpCallProbability(obj)
  ##coerce to matrix by subsetting desired rows and columns (here we choose all rows and co
```

```
integerRepresentation <- integerRepresentation[,]
p3 <- oligoClasses::i2p(integerRepresentation)
dimnames(p3) <- NULL
all.equal(p2, p3)
}
```

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

Class "[AlleleSet](#)", directly. Class "[SnpSet](#)", directly. Class "[eSet](#)", by class "[AlleleSet](#)", distance 2. Class "[VersionedBiobase](#)", by class "[AlleleSet](#)", distance 3. Class "[Versioned](#)", by class "[AlleleSet](#)", distance 4.

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)
```

```
addFeatureAnnotation
```

Add genomic annotation (chromosome, position) for several SNP

Description

Adds chromosome, position, and an indicator for whether the locus is polymorphic.

Usage

```
addFeatureAnnotation(object)
```

Arguments

`object` An object extending the `eSet` class.

Value

An `AnnotatedDataFrame`.

Author(s)

R. Scharpf

Examples

```
if(require(pd.genomewidesnp.6)){
  conn <- db(pd.genomewidesnp.6)
  dbListTables(conn)
  dbListFields(conn, "featureSet")
  ## get 5 snp identifiers
  ##sql <- "SELECT man_fsetid FROM featureSet WHERE man_fsetid LIKE 'SNP%' LIMIT 5"
  sql <- "SELECT man_fsetid FROM featureSet LIMIT 5"
  ids <- dbGetQuery(conn, sql)[[1]]
  A <- B <- matrix(rnorm(25), 5, 5, dimnames=list(ids, LETTERS[1:5]))
  obj <- new("AlleleSet",
    alleleA=A,
    alleleB=B,
    annotation="pd.genomewidesnp.6")
  featureData(obj) <- addFeatureAnnotation(obj)
  fData(obj)

  ##check against annotation package
  ##sql <- "SELECT man_fsetid, chrom, physical_pos FROM featureSet WHERE man_fsetid LIKE 'S
  ##dbGetQuery(conn, sql)
  }
  if(require(genomewidesnp6Crlmm)){
  ##alternatively, could use the Crlmm annotation package
  obj2 <- new("AlleleSet",
    alleleA=A,
    alleleB=B,
    annotation="genomewidesnp6")
  featureData(obj2) <- addFeatureAnnotation(obj2)
  fData(obj2)
  }
}
```

`affyPlatforms`*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

Examples

```
affyPlatforms ()
```

`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

batch	<i>The batch variable for the samples.</i>
-------	--------------------------------------------

Description

Copy number estimates are susceptible to systematic differences between groups of samples that were processed at different times or by different labs. Analysis algorithms that do not adjust for batch effects are prone to spurious measures of association. While 'batch' is often unknown, a useful surrogate is the scan date of the arrays or the 96 well chemistry plate on which the samples were arrayed during lab processing.

Usage

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

Arguments

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

Value

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

The method 'batchNames' returns the unique batches as a character string. The batch labels for each element in the `LinearModelParameter` class can be reassigned using the 'batchNames<-' replacement method.

Author(s)

R. Scharpf

See Also

[CNSet-class](#)

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)))
batchNames(test1) ##unique batches
batch(test1)
test1[1:20, 1:10]
##just NA's
nu(test1, "A")[1:10, ]
## similarly for the B allele
##nu(test1, "B")
##phi(test1, "A")
```

```

##phi(test1, "B")
## using ff objects
if(require(ff)){
x2 <- initializeBigMatrix("smallx", nr=250, nc=96*2)
x2[,] <- as.numeric(x)
test2 <- new("CNSet", alleleA=x, alleleB=x, call=x, callProbability=x, batch=as.character
test2
batchNames(test2) ##unique batches
batch(test2)
## ff objects
class(nu(test2, "A"))
(test2.sub <- test2[1:20, 1:10])
## after subsetting, all elements are matrices
class(nu(test2.sub, "A"))
}

```

batchStatistics *Accessor for batch statistics uses for copy number estimation and*

Description

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

Usage

```

batchStatistics(object)
batchStatistics(object) <- value

```

Arguments

object	An object of class <code>CNSet</code>
value	An object of class <code>AssayData</code>

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](#)

celfileDate	<i>Cel file dates</i>
-------------	-----------------------

Description

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

Usage

```
celfileDate(filename)
```

Arguments

filename	Name of cel file
----------	------------------

Value

character string

Author(s)

H. Jaffee

Examples

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

checkExists	<i>Checks to see whether an object exists and, if not, executes the</i>
-------------	-------------------------------------------------------------------------

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

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

Value

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

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

Author(s)

R. Scharpf

Examples

```
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)
```

chromosome2integer *Converts chromosome to integer*

Description

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

Usage

```
chromosome2integer(chrom)
```

Arguments

chrom chromosome

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

integer character

Author(s)

R. Scharpf

Examples

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

setCluster

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

Arguments

... arguments to be passed to `makeCluster` in the 'snow' package.
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 '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 <carvalho@bclab.org>

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

<code>name</code>	Prefix for filename.
<code>dim</code>	Dimensions.
<code>vmode</code>	Mode.
<code>initdata</code>	NULL.

Value

ff object.

Note

This function is meant to be used by developers.

See Also

ff

efsExample	<i>ExpressionFeatureSet Object</i>
------------	------------------------------------

Description

Example of ExpressionFeatureSet Object.

Usage

```
data (efsExample)
```

Format

Object belongs to ExpressionFeatureSet class.

Examples

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

scqsExample	<i>SnpCnvQSet Example</i>
-------------	---------------------------

Description

Example of SnpCnvQSet object.

Usage

```
data (scqsExample)
```

Format

Object belongs to SnpCnvQSet class.

Examples

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

`sfsExample`*SnpFeatureSet Example*

Description

Example of SnpFeatureSet object.

Usage

```
data(sfsExample)
```

Format

Object belongs to SnpFeatureSet class

Examples

```
data(sfsExample)
class(sfsExample)
```

`sqsExample`*SnpQSet Example*

Description

Example of SnpQSet instance.

Usage

```
data(sqsExample)
```

Format

Belongs to SnpQSet class.

Examples

```
data(sqsExample)
class(sqsExample)
```

`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)
```

`eSet-methods`*Accessors for eSet extensions*

Description

Accessors for variables stored in the featureData slot of a class inheriting from eSet.

Methods

```
signature(object = "eSet") ...
```

```
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 eSet

object = "SnpSet" General container 'exprs' inherited from eSet, not yet used.

```
ff_matrix-class    Class "ff_matrix"
```

Description

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

Objects from the Class

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

Slots

.S3Class: Object of class "character" ~~

Extends

Class "[oldClass](#)", directly.

Methods

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

Examples

```
showClass("ff_matrix")
```

ffdf-class	Class "ffdf"
------------	--------------

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.

fileConnections	<i>Open and close methods for matrices and numeric vectors</i>
-----------------	----------------------------------------------------------------

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 simply pass back the original matrix/vector.

Usage

```
open(con, ...)
```

Arguments

con	matrix or vector
...	ignored

Value

Returns matrix or numeric, depending on the class of con.

Author(s)

R. Scharpf

Examples

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

flags	<i>Batch-level summary of SNP flags.</i>
-------	------------------------------------------

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))
```

genomeBuild	<i>Genome Build Information</i>
-------------	---------------------------------

Description

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

Usage

```
genomeBuild(object)
```

Arguments

object PDIInfo or FeatureSet object.

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())
```

i2p *Functions to convert probabilities to integers, or integers to*

Description

Probabilities estimated in the `cr1mm` 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 `2pi` is

`as.integer(-1000*log(1-p))`

See Also

[confs](#)

Examples

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

`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")
```

kind *Array type*

Description

Retrieves the array type.

Usage

```
kind(object)
```

Arguments

object FeatureSet or DBPDInfo object

Value

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

Examples

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

```
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, nr, nc, vmode = "integer", initdata = NA)
initializeBigVector(name, n, 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

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/matrix is returned otherwise.

Examples

```
x <- initializeBigVector("test", 10)
class(x)
x
if (isPackageLoaded("ff"))
  finalizer(x) <- "delete"
rm(x)
```

ldSetOptions	<i>Set/check large dataset options.</i>
--------------	-----------------------------------------

Description

Set/check large dataset options.

Usage

```
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	<i>Number of samples for FeatureSet-like objects.</i>
----------------	-------------------------------------------------------

Description

Number of samples for FeatureSet-like objects.

Methods

x = "FeatureSet" Number of samples

list.celfiles	<i>List CEL files.</i>
---------------	------------------------

Description

Function used to get a list of CEL files.

Usage

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

Arguments

... Passed to [list.files](#)
listGzipped Logical. List .CEL.gz files?

Value

Character vector with filenames.

Note

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

See Also

[list.files](#)

Examples

```
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())
}

```

manufacturer-methods

Manufacturer ID for FeatureSet-like objects.

Description

Manufacturer ID for FeatureSet-like and DBPDInfo-like objects.

Methods

object = "FeatureSet" Manufacturer ID

object = "PDInfo" Manufacturer ID

ocLapply

lapply-like function that parallelizes code when possible.

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, setCluster, parStatus

oligoSnpSet-methods

Methods for oligoSnpSet class

Description

Methods for oligoSnpSet

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.

position	<i>Accessor to position information</i>
----------	-----------------------------------------

Description

position will return the genomic position of a SNP.

Usage

```
position(object)
```

Arguments

object	object inheriting from SnpLevelSet
--------	------------------------------------

Details

position will return genomic position of a SNP (number of basepairs from the 5-prime chromosomal end)

Value

an integer

Author(s)

R. Scharpf

relocateObject	<i>Changes filename and pattern attributes for ff objects.</i>
----------------	----------------------------------------------------------------

Description

See details

Usage

```
relocateObject(object, to)
```

Arguments

object	An object of class CNSet.
to	Character string indicating complete path to ff objects.

Details

This function is experimental

When `cr1mm` is used in conjunction with the `ff` package, large files are saved as `ff_matrix` of `ffdf` objects to avoid excessive RAM. The R object in RAM contains pointers to the location on disk. If the files on disk are moved, the data can no longer be accessed through the R object in memory. However, if the pointers contained in the R object are modified to point to the new location, the data can be accessed as usual. The `relocateObject` function edits the pointers of all `ff` objects embedded within the `CNSet` class. In particular, all elements stored in slot `assayData` and all elements stored in slot `batchStatistics`.

Value

An object of class `CNSet`.

Author(s)

R. Scharpf and L. Mireless

See Also

[CNSet-class](#)

Examples

```
## Not run:
require(ff)
cdfName <- "genomewidesnp6"
pathToCels <- "/thumper/ctsa/snpmicroarray/hapmap/raw/affy/1m"
outdir <- file.path(getwd(), "ff")
if(!file.exists(outdir)) stop("Please specify a valid directory for storing output")
if(!file.exists(pathToCels)) stop("Please specify the correct path to the CEL files")
celFiles <- list.celfiles(pathToCels, full.names=TRUE, pattern=".CEL")[1:6]
batch <- as.factor(substr(basename(celFiles), 13, 13))
ldPath(outdir)
ocProbesets(100e3)
ocSamples(200)
gtSet(celFiles, cdfName, batch=batch)
A(gtSet)[1:5, ]
pattern(A(gtSet))
filename(A(gtSet))
      ## Move all ff files to directory called 'testing'
outdir2 <- file.path(getwd(), "testing")
relocateObject(gtSet, to=outdir2)
## note the pointers have changed
pattern(A(gtSet))
filename(A(gtSet))

## End(Not run)
```

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

Examples

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

requireClusterPkgSet
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`

sampleNames-methods

Sample names for FeatureSet-like objects

Description

Returns sample names for FeatureSet-like objects.

Methods

object = "FeatureSet" Sample names

`splitIndicesByLength`*Tools to distribute objects across nodes or by length.*

Description

Tools to distribute objects across nodes or by length.

Usage

```
splitIndicesByLength(x, lg)
splitIndicesByNode(x)
```

Arguments

<code>x</code>	object to be split
<code>lg</code>	length

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)
splitIndicesByNode(x)
```

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