Package ‘altcdfenvs’

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**Title** alternative CDF environments (aka probeset mappings)

**Author** Laurent Gautier <lgautier@gmail.com>

**Maintainer** Laurent Gautier <lgautier@gmail.com>

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**Description** Convenience data structures and functions to handle cdfenvs

**License** GPL (>= 2)


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AffyProbesMatch-class

Class "AffyProbesMatch"

Description

Store the results of a call to matchAffyProbes.

Objects from the Class

Objects can be created by calls of the form new("AffyProbesMatch", ...).

An object will store the result of matching probe sequences against target sequences.

Slots

pm: Object of class "list": each element is vector of index values

mm: Object of class "list": each element is vector of index values

labels: Object of class "character"

chip_type: Object of class "character" and of length 1.

probes: Object of class "ANY": the probetable object used to perform the matches.

Methods

combine signature(x = "AffyProbesMatch", y = "AffyProbesMatch"): combine two instances.

This can be useful when splitting the list of target sequences to parallelized the job.

show signature(x = "AffyProbesMatch"): Show the instance.

toHypergraph signature(object = "AffyProbesMatch"): build an Hypergraph from the matches.
appendCdfEnvAffy

Examples

showClass("AffyProbesMatch")

appendCdfEnvAffy

append probe sets to a CdfEnvAffy

Description

append probe sets to a CdfEnvAffy

Usage

appendCdfEnvAffy(acdfenv, id, i, nocopy = TRUE)

Arguments

acdfenv instance of class CdfEnvAffy
id identifier for the probe set to add
i a matrix of indexes (see details)
nocopy whether to make a copy of the environment or not (see details)

Details

The matrix i must have one column per probe type. For typical Affymetrix chip types, there are two probe types: "pm" and "mm".

nocopy set to TRUE means that the environment is added the probe set 'in-situ' (this can boost execution speed if you add a lot of probe sets).

Value

An CdfEnvAffy is returned

Examples

data(cdfenvEx)

## pm and mm probe set
m <- matrix(1:10, ncol = 2)
colnames(m) <- c("pm", "mm")
appendCdfEnvAffy(cdfenvEx, "blabla", m)
indexProbes(cdfenvEx, c("pm", "mm"), "blabla")

## pm only probe set
m <- matrix(6:9, ncol = 1)
colnames(m) <- c("pm")
appendCdfEnvAffy(cdfenvEx, "blabla2", m)
## note that the unspecified "mm" were set to NA
indexProbes(cdfenvEx, c("pm", "mm"), "blabla2")

---

**buildCdfEnv.biostrings**

*Build CDF environments*

**Description**

Build CDF environment from Biostrings matchPDict results

**Usage**

```r
buildCdfEnv.biostrings(apm, abatch = NULL, 
nrow.chip = NULL, ncol.chip = NULL, 
simplify = TRUE, 
x.colname = "x", y.colname = "y", 
verbose = FALSE)
```

**Arguments**

- `apm` AffyProbesMatch
- `abatch` AffyBatch
- `nrow.chip` number of rows for the chip type (see details)
- `ncol.chip` number of columns for the chip type (see details)
- `simplify` simplify the environment built (removing target names when there is no matching probe)
- `x.colname` column name
- `y.colname` column name
- `verbose` verbose TRUE/ FALSE

**Details**

Whenever an `abatch` is specified, `nrow.chip` and `ncol.chip` are not needed. Specifying an `AffyBatch` in `abatch` is the easiest way to specify information about the geometry of a chip type.

**Value**

An instance of class CdfEnvAffy.
CdfEnvAffy-class

Class "CdfEnvAffy"

Description

A class to hold the information necessary to handle the grouping of probes in a set of probes, and to find XY coordinates of probes on a chip.

Objects from the Class

Objects can be created by calls of the form new("CdfEnvAffy", ...). Typically, there is an instance of the class for each type of chip (e.g., Hu6800, HG-U95A, etc.).

Slots

- envir: Object of class "environment". It has to be thought of as a hashtable: the keys are probe set identifiers, or gene names, and the values are indexes.
- envName: Object of class "character". A name for the environment.
- index2xy: Object of class "function". The function used to resolve index into xy coordinates. Unless you are an advanced user, you probably want to ignore this (and rely on the default provided with the package).
- xy2index: Object of class "function". The function used to resolve xy coordinates into index. Unless you are an advanced user, you probably want to ignore this (and rely on the default provided with the package).
- nrow: Object of class "integer". The number of rows of probes for the chip type.
- ncol: Object of class "integer". The number of columns of probes for the chip type.
- probeTypes: Object of class "character". The different types of probes stored for each probe set. In the case of Affymetrix chips, the probes are typically perfect match (pm) probes or mismatch probes (mm).
- chipType: Object of class "character". The name of the chip type the instance is associated with. This is useful when one starts to create alternative mappings of the probes on a chip (see associated vignette).

Methods

- \[\text{signature(object = "CdfEnvAffy", i = "character", j = "missing", drop = "boolean")}:\text{subset a cdf, that is return a new cdf containing only a subset of the probe sets. The subset of probe sets to take is identified as a vector of identifiers (mode "character").}\]
- \text{coerce signature(object = "CdfEnvAffy", "environment"): coerces an instance of the class to an environment.}\]
- \text{coerce signature(object = "CdfEnvAffy", "Cdf"): coerces an instance of the class to a Cdf.}\]
- \text{geneNames signature(object = "CdfEnvAffy"): Return the names of the known probe sets (of course, it depends on the associated CDF).}\]
**index2xy** signature(object = "CdfEnvAffy", i="integer"): convert index values into XY coordinates.

**indexProbes** signature(object = "CdfEnvAffy", which = "character", probeSetNames = NULL): obtain the indexes for the probes associated with the probe set name probeSetNames. When probeSetNames is set to NULL (default), the indexes are returned for the probe sets defined on the chip. See indexProbes.CdfEnvAffy

**plot** signature(x = "CdfEnvAffy", y = "missing"): Plot the chip. It mainly sets coordinates for further plotting (see examples). See plot.CdfEnvAffy

**show** signature(object = "CdfEnvAffy"): Print method.

**xy2index** signature(object = "CdfEnvAffy", x="integer", y="integer"): convert XY coordinates into index values.

**toHypergraph** signature(object = "CdfEnvAffy"): convert XY coordinates into index values.

**Author(s)**

Laurent Gautier

**See Also**

indexProbes.CdfEnvAffy, plot.CdfEnvAffy

**Examples**

```r
## build an instance
library(hgu95acdf)
cdfenv.hgu95a <- wrapCdfEnvAffy(hgu95acdf, 640, 640, "HG-U95A")
show(cdfenv.hgu95a)

## find the indexes for a probe set (pm only)
ip <- indexProbes(cdfenv.hgu95a, "pm", "1000_at")[1]
## get the XY coordinates for the probe set
xy <- index2xy(cdfenv.hgu95a, ip)

## plot the chip
plot(cdfenv.hgu95a)

## plot the coordinates
plotLocation(xy)

## subset the environment
cdfenv.hgu95a.mini <- cdfenv.hgu95a["1000_at"]
```
Description

An example of CdfEnvAffy

Usage

data(cdfenvEx)

Format

The format is: Formal class ’CdfEnvAffy’ [package "altcdfenvs"] with 8 slots ..@ index2xy :function (object, i) ..@ xy2index :function (object, x, y) ..@ envir :length 2 <environment> ..@ envName : chr "ZG-DU33" ..@ nrow : int 100 ..@ ncol : int 100 ..@ probeTypes: chr [1:2] "pm" "mm" ..@ chipType : chr "ZG-DU33"

Examples

data(cdfenvEx)

print(cdfenvEx)

cdfenvs

functions related to cdfenvs

Description

A set of functions to handle cdfenvs

Usage

wrapCdfEnvAffy(cdfenv, nrow.chip, ncol.chip, chiptype, check = TRUE, verbose = FALSE)
getCdfEnvAffy(abatch)
buildCdfEnv.matchprobes(matches, ids, probes.pack, abatch=NULL, nrow.chip=NULL, ncol.chip=NULL, chiptype=NULL, mm=NA, simplify = TRUE, x.colname = "x", y.colname = "y", verbose=FALSE)
Arguments

- `abatch`: an `AffyBatch`
- `cdfenv`: A cdfenv environment
- `check`: perform consistency check or not
- `chiptype`: A name for the chip type
- `ids`: a vector of probe set identifiers for the matches
- `matches`: a list as returned by the function `combineAffyBatch`
- `mm`: The value to store for MMs
- `ncol.chip`: The number of columns for the chip type
- `nrow.chip`: The number of rows for the chip type
- `probes.pack`: The name of the probe package
- `simplify`: Simplify the environment created by removing the ids without any matching probe
- `x.colname`, `y.colname`: see the `getxy.probeseq`
- `verbose`: verbosity (TRUE or FALSE)

Value

An instance of class `CdfEnvAffy`.

Examples

```r
## See the main vignette
```

```
copyCdfEnvAffy

make a copy of a CdfEnvAffy
```

Description

make a copy of a CdfEnvAffy

Usage

```r
copyCdfEnvAffy(acdfenv)
```

Arguments

- `acdfenv`: instance of class `CdfEnvAffy`
countduplicated

Value

A CdfEnvAffy

See Also

CdfEnvAffy-class, copyEnv

countduplicated Count the number of times probes are used

Description

This function counts the number of times the probes in a CdfEnvAffy are found in this object.

Usage

countduplicated(x, incomparables = FALSE, verbose = FALSE)

Arguments

x An instance of CdfEnvAffy-class
incomparables (not implemented yet, keep away)
verbose verbose or not

Value

An environment is returned. Each element in this environment has the same identifier than its corresponding probe set in the CdfEnvAffy-class and contains the number of times a probe is in use in the environment (instead of an index number in the CdfEnvAffy-class).

Author(s)

Laurent

See Also

CdfEnvAffy-class
getxy.probeseq

Description
A function to get the XY coordinates from a probes sequences data frame

Usage
getxy.probeseq(ppset.id = NULL, probeseq = NULL, i.row = NULL, xy.offset = NULL, x.colname = "x", y.colname = "y")

Arguments
- ppset.id: The probe sets of interest (a vector of mode character).
- probeseq: The probe sequence data.frame (see details).
- i.row: Row indexes in the data.frame (see details).
- xy.offset: Offset for the xy coordinates. if NULL, uses the default offset stored as an option for the affy package.
- x.colname, y.colname: The probe sequence packages have seen the names for the columns in their data.frame. This parameters exists to let us follow these changes.
index2xy

Details

The data.frame passed as argument probeseq is expected to have (at least) the following columns: Probe.X, Probe.Y and Probe.Set.Name. When the argument ppset.id is not null, the probe sets

Value

A matrix of two columns. The first column contains x coordinates, while the second column contains y coordinates.

Warning

The parameter xy.offset.one is here for historical reasons. This should not be touched, the option in the affy package should be modified if one wishes to modify this.

This function should not be confused with the methods index2xy and similar. Here the the XY coordinate come from a data.frame that stores information about an arbitrary number probes on the chip. (See the 'probe sequence' data packages on Bioconductor, and the package Biostrings).

The methods index2xy are meant to interact with instances of class AffyBatch.

Author(s)

Laurent

Examples

##---- Should be DIRECTLY executable !! ----

index2xy

Functions to shuttle from indexes to XY coordinates

Description

Functions to shuttle from indexes to XY coordinates.

Usage

index2xy(object, ...)
xy2index(object, ...)
index2xy.CdfEnvAffy(object, i)
xy2index.CdfEnvAffy(object, x, y)

Arguments

object An object of class CdfEnvAffy.
i A vector of indexes.
x, y Vectors of X and Y coordinates.
... Optional parameters (not used).
indexProbes.CdfEnvAffy

Value
A vector of integers (for xy2index methods), or a matrix of two columns (for index2xy methods).

See Also
CdfEnvAffy-class

Examples
## To be done...

indexProbes.CdfEnvAffy

indexes for probes

Description
A function to get the index for probes

Usage
indexProbes.CdfEnvAffy(object, which, probeSetNames = NULL)

Arguments
object CdfEnvAffy
which which kind of probe are of interest (see details).
probeSetNames names of the probe sets of interest. If NULL, all the probe sets are considered.

Details
The parameter which let one specify which category of probes are of interest. In the case of Affymetrix chips, probes can be "pm" probes or "mm" probes. It the parameter is set to c("pm", "mm"), both are returned. Should other categories be defined, they can be handled as well.

Value
A list of indexes.

See Also
CdfEnvAffy-class, AffyBatch-class
**matchAffyProbes**

**Match the probes on an Affymetrix array**

**Description**

Match the individual probes on an Affymetrix array to arbitrary targets.

**Usage**

```r
mmProbes(probes)

matchAffyProbes(probes, targets, chip_type, 
matchmm = TRUE, 
selectMatches = function(x) which(elementNROWS(x) > 0), 
...)
```

**Arguments**

- `probes`: a probetable object
- `targets`: a vector of references
- `chip_type`: a name for the chip type.
- `matchmm`: whether to match MM probes or not
- `selectMatches`: a function to select matches (see Details).
- `...`: further arguments to be passed to matchPDict.

**Details**

The matching is performed by the function `matchPDict`. The man page for that function will indicate what are the options it accepts.

In the case where a large number targets are given, like when each target represents a possible mRNA, is it expected to have a largely sparse incidence matrix, that is a low number of probes matching every target. For that reason, only the index of matching probes are associated with each given target, with the function `selectMatches` giving the definition of what are matching probes. The default function just count anything matching, but the user can specify a more stringent definition if wanted.

**Value**

- `mmProbes` returns a vector of MM probe sequences.
- `matchAffyProbes` returns an instance of `AffyProbesMatch-class`.

**Author(s)**

Laurent Gautier
See Also

matchPDict for details on how the matching is performed, AffyProbesMatch-class and buildCdfEnv.biostrings

Examples

library(hgu133aprobe)

filename <- system.file("exampleData", "sample.fasta", 
  package="altcdfenvs")

fasta.seq <- readDNAStringSet(filename)

targets <- as.character(fasta.seq)
names(targets) <- sub("^>.+\|(NM[^ \|]+|Hs[^ \|]+)\| ? .+$", ", 
  names(targets))

m <- matchAffyProbes(hgu133aprobe, 
  targets, 
  "HG-U133A")

---

plot.CdfEnvAffy A function to ‘plot’ a CdfEnvAffy

Description

A function to set the axis and plot the outline for a CdfEnvAffy

Usage

## S3 method for class 'CdfEnvAffy'
plot(x, xlab = "", ylab = ", main = x@chipType, ...)

Arguments

x a CdfEnvAffy
xlab label for the rows
ylab label for the columns
main label for the plot. The chip-type by default.
... optional parameters to be passed to the underlying function plot

Details

This function does not ‘plot’ much, but sets the coordinates for further plotting (see the examples).
**read.FASTA.entry**

Functions to work with FASTA files / connections

**Description**

Set of functions to work with biological sequences stored in FASTA format.

**Usage**

```r
countskip.FASTA.entries(con, linebreaks = 3000)
grep.FASTA.entry(pattern, con, ...)
## S3 method for class 'FASTA'
print(x, ...)
read.FASTA.entry(con, linebreaks = 3000)
read.n.FASTA.entries(con, n, linebreaks = 3000)
read.n.FASTA.entries.split(con, n, linebreaks = 3000)
read.n.FASTA.headers(con, n, linebreaks = 3000)
read.n.FASTA.sequences(con, n, linebreaks = 3000)
skip.FASTA.entry(con, skip, linebreaks = 3000)
write.FASTA(x, file="data.fasta", append = FALSE)
```

**Arguments**

- `append`: append to the file (or not)
- `con`: a connection
- `file`: a file name
- `linebreaks`: (to optimize the parsing, probably safe to leave it as it is)
- `n`: number of entries to read
- `pattern`: a pattern (to be passed to the function `grep`)
- `skip`: number of entries to skip
- `x`: a FASTA sequence object
- `...`: optional arguments to be forwarded to the function `print` or to the function `grep`
Details

countskip.FASTA.entries skips the remaining FASTA entries currently remaining in the connection and return the count. grep.FASTA.entry returns the next FASTA entry in the connection that matches a given regular expression. print.FASTA prints a FASTA object. read.FASTA.entry reads the next FASTA entry in the connection. read.n.FASTA.entries reads the n next FASTA entries and returns a list of FASTA objects. read.n.FASTA.entries.split reads the n next FASTA entries and returns a list of two elements: headers and sequences. read.n.FASTA.headers reads the n next FASTA headers. read.n.FASTA.sequences reads the n next FASTA sequences. skip.FASTA.entry skips a given number of FASTA entries. write.FASTA write a FASTA object into a connection.

Value

The value returned depends on the function. See above.

Author(s)

Laurent Gautier

Examples

```r
filename <- system.file("exampleData", "sample.fasta", package="altcdfenvs")
con <- file(filename, open="r")

fasta.seq <- grep.FASTA.entry("NM_001544\..2", con)
close(con)

print(fasta.seq)
```

removeIndex A function to remove probes in an environment

Description

A function to remove probes in an environment, given their index.

Usage

```r
removeIndex(x, i, simplify = TRUE, verbose = FALSE)
```

Arguments

- **x**: An instance of CdfEnvAffy-class
- **i**: A vector of indexes (integers !).
- **simplify**: Simply the resulting CdfEnvAffy (see details).
- **verbose**: verbose output or not.
toHypergraph

Details

The probes to be removed are set to NA in the CdfEnvAffy. When simplify is set to TRUE the probe sets are simplified whenever possible. For example, if both pm and mm for the same probe pair are set to NA, then the probe pair is removed from the probe set.

Value

An instance of CdfEnvAffy-class is returned.

Author(s)

Laurent Gautier

See Also

CdfEnvAffy-class

Examples

```r
## use plasmodiumanopheles chip as an example
if (require(plasmodiumanophelescdf)) {

## wrap in a (convenient) CdfEnvAffy object
planocdf <- wrapCdfEnvAffy(plasmodiumanophelescdf, 712, 712, "plasmodiumanophelescdf")
print(planocdf)

## ask for the probe indexed '10759' to be removed
## (note: if one wishes to remove from X/Y coordinates,
## the function xy2index can be of help).
planocdfCustom <- removeIndex(planocdf, as.integer(10759))

## let see what happened (we made this example knowing in which
## probe set the probe indexed '10759' is found).
indexProbes(planocdf, "pm", "200000_s_at")
indexProbes(planocdfCustom, "pm", "200000_s_at")
## The 'second' pm probe (indexed '10579') in the probe set is now set
## to NA.
}
```

Description

Transform to an hypergraph

Usage

toHypergraph(object, ...)

unique.CdfEnvAffy

Arguments

object Object derived from class AffyProbesMatch.
...
Unused.

Value

An **Hypergraph-class** object.

### S3 method for class 'CdfEnvAffy'

```r
unique(x, incomparables = FALSE, simplify = TRUE, verbose = FALSE, ...)
```

Arguments

- `x` An instance of CdfEnvAffy-class
- `incomparables` (not yet implemented)
- `simplify` simplify the result
- `verbose` verbose or not
- `...` (here for compatibility with the generic unique)

Details

The parameter `simplify` has the same function as the one with the same name in `countduplicated`.

Value

An instance of CdfEnvAffy-class in which probes used several times are removed.

Warning

The function differs slightly from the generic `unique`. Here the elements found in several place a merely removed.

Author(s)

Laurent
validAffyBatch

See Also

countduplicated

Examples

## not yet here...

---

validAffyBatch **Check validity of a CdfEnvAffy.**

Description

Tries to see if a CdfEnvAffy, or a pair of AffyBatch / CdfEnvAffy is valid.

Usage

validAffyBatch(abatch, cdfenv)
validCdfEnvAffy(cdfenv, verbose=TRUE)
printValidCdfEnvAffy(x)

Arguments

- **abatch**: instance of *AffyBatch-class*
- **cdfenv**: instance of *CdfEnvAffy-class*
- **verbose**: verbose or not
- **x**: object returned by validCdfEnvAffy

Details

The function validAffyBatch calls in turn validCdfEnvAffy.

See Also

*AffyBatch-class, CdfEnvAffy-class*

Examples

## To be done...
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