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

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Collate appendCdfEnvAffy.R buildCdfEnv.matchprobes.R
  buildCdfEnv.bioststrings.R CdfEnv.R cdfenvs.R copyCdfEnvAffy.R
  readFASTA.R removeIndex.R unique.CdfEnvAffy.R

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AffyProbesMatch-class

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 is 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.

Examples

`showClass("AffyProbesMatch")`
**appendCdfEnvAffy**

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

```r
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

```r
m <- matrix(6:9, ncol = 1)
colnames(m) <- c("pm")
appendCdfEnvAffy(cdfenvEx, "blabla2", m)
```

### note that the unspecified "mm" were set to NA

```r
indexProbes(cdfenvEx, c("pm", "mm"), "blabla2")
```
buildCdfEnv.biostrings

Build CDF environments

Description
Build CDF environment from Biostrings matchPDict results

Usage
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 the 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 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{\texttt{\textbackslash \{} \text{\texttt{signature(object = "CdfEnvAffy"}}, i = "character"\texttt{, j = "missing"\texttt{, drop = "boolean"\texttt{)}}: 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{\texttt{ coercesignature(object = "CdfEnvAffy"", "environment")): coerce an instance of the class to an environment.

\text{\texttt{ coercesignature(object = "CdfEnvAffy"", "Cdf")}: coerce an instance of the class to a Cdf.

\text{\texttt{\texttt{signature(object="CdfEnvAffy")}: Return the names of the known probe sets (of course, it depends on the associated CDF).

\text{\texttt{\texttt{signature(object = "CdfEnvAffy", i="integer")}: convert index values into XY coordinates.

\text{\texttt{\texttt{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

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

\text{\texttt{\texttt{signature(object = "CdfEnvAffy")}: Print method.

\text{\texttt{\texttt{signature(object = "CdfEnvAffy", x="integer", y="integer")}: convert XY coordinates into index values.

\text{\texttt{\texttt{signature(object = "CdfEnvAffy", x="character", y="character")}: convert XY coordinates into index values.

Author(s)

Laurent Gautier

See Also

\texttt{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"]
```

---

cdfenvEx CdfEnvAffy

Description

An example of CdfEnvAffy

Usage

```r
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

```r
data(cdfenvEx)
print(cdfenvEx)
```
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
chip type 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

## See the main vignette
### copyCdfEnvAffy

**Description**
make a copy of a CdfEnvAffy

**Usage**
copyCdfEnvAffy(acdfenv)

**Arguments**
- `acdfenv`: instance of class CdfEnvAffy

**Details**
Make a copy can be needed since a CdfEnvAffy contains an environment

**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

geneNames.CdfEnvAffy  get the names of the known probe sets

description

geneNames.CdfEnvAffy(object)

Arguments

object  CdfEnvAffy-class

Value

a vector of mode character

getxy.probeseq  A function to get the XY coordinates from a probes sequences data frame

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.
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).```
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 Affymatrix array to arbitrary targets.

Usage

```
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

```r
library(hgu133aprobe)

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

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

```r
## 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).

Author(s)

Laurent

See Also

CdfEnvAffy-class
Examples

## See "CdfEnvAffy-class"

read.FASTA.entry

Functions to work with FASTA files / connections

Description

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

Usage

- `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.
removeIndex

Value

The value returned depends on the function. See above.

Author(s)

Laurent Gautier

Examples

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

fasta.seq <- grep.FASTA.entry("NM_001544\1.2", 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.

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
## 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

Remove duplicated elements from a CdfEnvAffy

Usage

## S3 method for class 'CdfEnvAffy'
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

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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