Package ‘GenomeGraphs’

March 28, 2017

Version 1.34.0

Title Plotting genomic information from Ensembl

Author Steffen Durinck <sdurinck@gmail.com>, James Bullard <bullard@berkeley.edu>

Maintainer Steffen Durinck <sdurinck@gmail.com>

Depends R (>= 2.10), methods, biomaRt, grid

biocViews Visualization, Microarray

Description Genomic data analyses requires integrated visualization of known genomic information and new experimental data. GenomeGraphs uses the biomaRt package to perform live annotation queries to Ensembl and translates this to e.g. gene/transcript structures in viewports of the grid graphics package. This results in genomic information plotted together with your data. Another strength of GenomeGraphs is to plot different data types such as array CGH, gene expression, sequencing and other data, together in one plot using the same genome coordinate system.


License Artistic-2.0

LazyLoad yes

NeedsCompilation no

R topics documented:

AnnotationTrack-class .................................................. 3
BaseTrack-class ............................................................ 3
cn ............................................................... 4
DisplayPars ............................................................. 5
DisplayPars-class ......................................................... 6
drawGD ............................................................ 7
drawTrackOverlay-methods ............................................... 7
ExonArray-class ........................................................ 8
exonProbePos .......................................................... 9
gdObject-class ......................................................... 9
gdPlot ............................................................ 10
Gene-class ............................................................... 11
geneBiomart ........................................................... 12
GeneModel-class ......................................................... 13
GeneRegion-class ....................................................... 14
**AnnotationTrack-class**  
*Class "AnnotationTrack"

**Description**

A generic object to store annotation

**Objects from the Class**

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

**Slots**

- `chr`: Object of class "numeric"
- `strand`: Object of class "numeric"
- `regions`: Object of class "dfOrNULL"
- `dp`: Object of class "DisplayPars"

**Extends**

Class "gdObject", directly.

**Methods**

- `drawGD` signature(gdObject = "AnnotationTrack"): ...
- `getPlotId` signature(obj = "AnnotationTrack"): ...
- `initialize` signature(.Object = "AnnotationTrack"): ...

**Author(s)**

James Bullard

**Examples**

`showClass("AnnotationTrack")`

---

**BaseTrack-class**  
*Class “BaseTrack” represents base specific data*

**Description**

Represents specific data, e.g. how many times was every base sequenced

**Objects from the Class**

Objects can be created by calls of the form `new("BaseTrack", ...)`.
Slots

- **base**: Object of class "numeric". Is a vector of base positions.
- **value**: Object of class "numeric". Is a vector of corresponding values for every base.
- **strand**: Object of class "character" represents that DNA strand.
- **dp**: Object of class DisplayPars to control various features of how the track is displayed.

Extends

Class "gdObject", directly.

Methods

- **show** signature(object = "BaseTrack"): ...

Author(s)

Steffen Durinck

References

http://www.stat.berkeley.edu/~steffen/

See Also

objects to See Also as gdPlot

Examples

```r
if (interactive()) {
  data("exampleData", package="GenomeGraphs")
  ga <- new("GenomeAxis")
  bt <- new("BaseTrack", base = yeastCons1[,1], value = yeastCons1[,2],
    dp = DisplayPars(color = "darkblue"))
  gdPlot(list(ga, bt))
}
```

---

**cn**

Contains dummy copy number data

Description

Contains dummy copy number data

Examples

#
DisplayPars

DisplayPars constructs objects of type DisplayPars which are used to effect the display of gdObjects.

Description

DisplayPars takes any number of named arguments which will be used by the drawGD method of the gdObject. These arguments are analogous to both par and gp of the traditional and grid graphics systems respectively. Different functions support different graphical parameters - thus it is necessary to consult the documentation of the particular gdObject to determine which DisplayPars will be used.

Usage

DisplayPars(...)

Arguments

... name value pairs

Details

It is not recommended to call new("DisplayPars", ...) directly; rather this function DisplayPars() should be called instead. If a gdObject has already been instantiated then the appropriate method for changing graphical parameters is: setPar.

Value

Returns an object of type DisplayPars, generally this will be called during a call to the new function for a particular gdObject.

Author(s)

James Bullard

Examples

minbase = 10000
dmaxbase = 15000
mart <- useMart("ensembl", dataset = "scerevisiae_gene_ensembl")
genesplus <- new("GeneRegion", start = minbase, end = maxbase, biomart = mart,
                     strand = "+", chromosome = "I", dp = DisplayPars(color = "red"))
gaxis <- new("GenomeAxis", add53 = TRUE, add35 = TRUE)
genesminus <- new("GeneRegion", start = minbase, end = maxbase, biomart = mart,
                     strand = "-", chromosome = "I", dp = DisplayPars(color = "purple", size = 2))
title <- new("Title", title = "genes in a region")
gdPlot(list(genesplus, gaxis, genesminus, title), minbase, maxbase)
Class "DisplayPars" is used to specify graphical parameters to gdObjects.

Description

The DisplayPars functions analogously to par and gp. Generally the class is instantiated using the DisplayPars function rather than directly.

Objects from the Class

Objects can be created by calls of the form DisplayPars(...) rather than calls to: new("DisplayPars", ...) by calling the DisplayPars function directly in the constructor the gdObjects are guaranteed to have the appropriate defaults.

Slots

pars: Object of class "environment" Generally this slot is not accessed directly.

Methods

getPar signature(obj = "DisplayPars"): gets a graphical parameter by name
initialize signature(.Object = "DisplayPars"): This constructor should not be called directly.
setPar signature(obj = "DisplayPars"): sets a graphical parameter - see the example below.
    Often it is easier to set the graphical parameter from within the gdObject.
show signature(object = "DisplayPars"): prints current graphical parameters

Warning

The DisplayPars class should not be manipulated directly. The preferred method for interacting with the class can be seen in the example below.

Author(s)

James Bullard

Examples

showClass("DisplayPars")

if (interactive()) {
  minbase = 10000
  maxbase = 15000
  mart <- useMart("ensembl", dataset = "scerevisiae_gene_ensembl")
  genesplus <- new("GeneRegion", start = minbase, end = maxbase, biomart = mart,
                     strand = "+", chromosome = "I", dp = DisplayPars(size = 2))
  ## plot it.
  gdPlot(list(genesplus, new("Title", title = "genes")), minbase, maxbase)
  ## to obtain a list of the current graphical parameters:
  print(genesplus@dp)
### to set a parameter:
setPar(genesplus, "protein_coding", "pink")
gdPlot(list(genesplus, new("Title", title = "genes")), minbase, maxbase) 
}

drawGD

*Generic called on each gdObject to do the plotting.*

**Description**

This generic gets called on each of the gdObjects (obviously the generic is implemented by a method for each object) and thus if a user wishes to implement new gdObjects they need to have access to this generic.

**Usage**

drawGD(gdObject, minBase, maxBase, vpPosition, ...)

**Arguments**

gdObject gdObject list to plot
minBase Minimum base position to plot
maxBase Maximum base position to plot
vpPosition vpPosition
... Ignored

drawTrackOverlay-methods

*This method does the drawing of a track overlay. One should implement this method to gain track plotting functionality.*

**Description**

Methods for function drawTrackOverlay in Package ‘GenomeGraphs’

**Methods**

Segmentation

Smoothing
ExonArray-class

Class "ExonArray" representing probe level exon array data from Affymetrix

Description

Represents probe level exon array data from Affymetrix. Makes it possible to visualize alternative splicing as measured by the Affymetrix exon array platform and relate it to known transcript isoforms annotated by Ensembl.

Objects from the Class

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

Slots

- `intensity`: Object of class "matrix", array data matrix containing probes as the rows and samples as the columns
- `probeStart`: Object of class "numeric" vector with the start positions of the probes
- `probeEnd`: Object of class "numeric" vector with the end positions of the probes
- `probeId`: Object of class "character" vector containing the probeset identifiers
- `nProbes`: Object of class "numeric" vector defining how many probes there are for each exon/probeset
- `displayProbesets`: Object of class "logical" used to indicate if probe set names should be plotted or not

Extends

Class "gdObject", directly.

Methods

- `show` signature(object = "ExonArray"): ...

Author(s)

Steffen Durinck

References

http://www.stat.berkeley.edu/~steffen/

See Also

objects to See Also as `gdPlot`
Examples

```r
if(interactive()){
  data("unrData", package="GenomeGraphs")
  library(biomaRt)
  mart = useMart("ensembl", dataset="hsapiens_gene_ensembl")

  title = new("Title", title = "ENSG000000009307", dp = DisplayPars(color = "darkslategray"))
  exmapcol = rep("khaki", length(unrNProbes))
  exmapcol[28]="darkred"
  probeSetCol = rep("grey", length(unrNProbes))
  probeSetCol[27:28]="darkslategray"
  probeSetLwd = rep(1, length(unrNProbes))
  probeSetLwd[27:28]=3

  exon = new("ExonArray", intensity = unrData, probeStart = unrPositions[,3], probeEnd=unrPositions[,4], probeId =...) = "blue", mapColor = exmapcol, probeSetColor = probeSetCol, probeSetLwd = probeSetLwd), displayProbesets=FALSE)
  exon2 = new("ExonArray", intensity = unrData, probeStart = unrPositions[,3], probeEnd=unrPositions[,4], probeId =...) = "blue", mapColor = exmapcol, probeSetColor = probeSetCol, probeSetLwd = probeSetLwd, plotMap=FALSE), displayProbesets=TRUE)
  affyModel = new("GeneModel", exonStart = unrPositions[,3], exonEnd = unrPositions[,4])
  gene = new("Gene", id = "ENSG000000009307", biomart = mart)
  transcript = new("Transcript", id = "ENSG000000009307", biomart = mart)
  legend = new("Legend", legend = c("affyModel","gene"), dp = DisplayPars(color= c("darkgreen","orange")))

  gdPlot(list(title,exonarray1 = exon,exonarray2= exon, AffymetrixModel= affyModel, gene, transcript, legend), minBase = min(exon@probeStart), maxBase=max(exon@probeEnd))
}
```
Methods

getCex signature(obj = "gdObject"): ...
ggetColor signature(obj = "gdObject"): ...
getLty signature(obj = "gdObject"): ...
getLwd signature(obj = "gdObject"): ...
getPar signature(obj = "gdObject"): ...
getPch signature(obj = "gdObject"): ...
getPointSize signature(obj = "gdObject"): ...
getSize signature(obj = "gdObject"): ...
initialize signature(.Object = "gdObject"): ...
setPar signature(obj = "gdObject"): ...
showDisplayOptions signature(obj = "gdObject"): ...
showDisplayOptions signature(obj = "character"): ...

Author(s)

James Bullard

Examples

showClass("gdObject")

gdPlot

gdPlot is the main plotting function of the GenomeGraphs package

Description

gdPlot is the main plotting function of the GenomeGraphs package. A collection of objects are
given as a list and these will then be plotted in the order given.

Usage

gdPlot(gdObjects, minBase = NA, maxBase = NA, overlays = NULL,
   labelColor = "black", labelCex = 1, labelRot = 90)

Arguments

gdObjects This is either a list of gdObjects which will be plotted from top to bottom or a
single gdObject to be plotted.
minBase minBase defines the minimum base that will be plotted, if ommitted a minimum
is determined from the objects in gdObjects if possible.
maxBase maxBase defines the maximum base that will be plotted, if ommitted a minimum
is determined from the objects in gdObjects if possible.
overlays overlays defines a set of regions to overlay on the plot. This argument is either
a list or a single Overlay object.
labelColor Draw the labels with the given colors.
labelCex Character expansion factor.
labelRot Rotate the track labels labelRot degrees.
Author(s)

Steffen Durinck and James Bullard

References

http://www.stat.berkeley.edu/~steffen/

Examples

data("exampleData", package="GenomeGraphs")

minbase = min(probestart)
maxbase = max(probestart)

mart = useMart("ensembl", dataset="hsapiens_gene_ensembl")

genesplus = new("GeneRegion", start = minbase, end = maxbase, strand = "+", chromosome = "3", biomart=mart)
genesmin = new("GeneRegion", start = minbase, end = maxbase, strand = "-", chromosome = "3", biomart=mart)

seg <- new("Segmentation", segments = segments[[1]],
          segmentStart = segStart[[1]], segmentEnd = segEnd[[1]],
          dp = DisplayPars(color = "dodgerblue2", lwd=2, lty = "dashed")

cop <- new("GenericArray", intensity = cn, probeStart = probestart,
           trackOverlay = seg, dp = DisplayPars(size=3, color = "seagreen", type="dot")

ideog = new("Ideogram", chromosome = "3")

expres = new("GenericArray", intensity = intensity, probeStart = exonProbePos,
             dp = DisplayPars(color="darkred", type="point")

geneAxis = new("GenomeAxis", add53 = TRUE, add35=TRUE)
gdPlot(list(ideog, expres, cop, genesplus, geneAxis, genesmin), minBase = minbase, maxBase = maxbase)

---

**Gene-class**

Class "Gene" represents the Ensembl Gene level annotation

**Description**

Class "Gene" represents the Ensembl Gene level annotation. Upon creation of an object of this class, intron and exon boundaries are retrieved from Ensembl.

**Objects from the Class**

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

**Slots**

- **id**: Object of class "character", representing a unique identifier for the gene or a vector of identifiers for genes that are located near each other (or at least on the same chromosome).
- **type**: Object of class "character", representing the type of identifier used, e.g. hgnc\_symbol, entrezgene and ensembl\_gene\_id, check the list Filters function of the biomaRt package for more identifier options.
biomart: Object of class "Mart", contains the link to the Ensembl database and should be created using the useMart function from the biomaRt package
ens: Object of class "data.frame", contains the output from the Ensembl query, users don’t need to give a value to this

Methods

initialize signature(.Object = "Gene"): ...
drawGD signature(.Object = "Gene"): ...
show signature(object = "Gene"): ...

Author(s)

Jim Bullard and Steffen Durinck

References

http://www.stat.berkeley.edu/~steffen/

See Also

objects to See Also as gdPlot

Examples

if(interactive()){
mart = useMart("ensembl", dataset="hsapiens_gene_ensembl")
gene = new("Gene", id = "ENSG000000095203", type="ensembl_gene_id", biomart = mart)
gdPlot(list(gene), minBase = 110974000, maxBase = 111122900)
}

geneBiomart AnnotationTrack objects from biomaRt

Description

Convenience function to construct an AnnotationTrack object from biomaRt.

Usage

geneBiomart(id, biomart, type = "ensembl_gene_id", dp = NULL)

Arguments

id Gene identifier
biomart Mart object connected to BioMart database, use useMart function to generate
type Type of identifier used, this should be a filter of the BioMart database e.g. ensembl_gene_id, hgnc_symbol
dp Display parameters
Value
An AnnotationTrack object

Author(s)
James Bullard

Description
This class represents a custom gene model defined by exon boundaries. An example of this class could be an Affymetrix gene model used to create the Affy Exon array

Objects from the Class
Objects can be created by calls of the form `new("GeneModel", ...)`. 

Slots
- `exonStart`: Object of class "numeric", vector containing the start positions of the exons that are to be drawn
- `exonEnd`: Object of class "numeric", vector containing the end positions of the exons that are to be drawn
- `chromosome`: Object of class "numeric", chromosome name
- `dp`: Object of class "DisplayPars", color of the exons and size of the exon model in the final plot

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

Author(s)
Steffen Durinck

References
http://www.stat.berkeley.edu/~steffen/

See Also
objects to See Also as `gdPlot`

Examples
```r
data("unrData", package="GenomeGraphs")
affyModel = new("GeneModel", exonStart = unrPositions[,3], exonEnd = unrPositions[,4])
gdPlot(list(affyModel), minBase = min(unrPositions[,3]), maxBase=max(unrPositions[,4]))
```
**GeneRegion-class**

Class "GeneRegion", representing gene structures in a defined genomic region

**Description**

Given a start and end position and a chromosome name, all gene structures in this region will be retrieved from Ensembl upon creation of the object.

**Objects from the Class**

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

**Slots**

- **start**: Object of class "numeric", start position
- **end**: Object of class "numeric", end position
- **chromosome**: Object of class "character", chromosome name
- **strand**: Object of class "character", represents the strand from which the gene structures should be retrieved. Value is either + or -
- **biomart**: Object of class "Mart", containing the link to the Ensembl database. This should be created by the useMart function from the biomaRt package
- **ens**: Object of class "data.frame", output of the biomaRt query, should not be used by users

**Methods**

- `drawGD` signature(.Object = "GeneRegion"):
- `initialize` signature(.Object = "GeneRegion"):
- `show` signature(object = "GeneRegion"):

**Author(s)**

Steffen Durinck

**References**

http://www.stat.berkeley.edu/~steffen/

**See Also**

objects to See Also as gdPlot

**Examples**

```r
if(interactive()){
  mart = useMart("ensembl", dataset="hsapiens_gene_ensembl")
  plusStrand = new("GeneRegion", chromosome = "17", start = 30450000, end = 30550000, strand = "+", biomart = mart)
  genomeAxis = new("GenomeAxis", add53=TRUE)
  gdPlot(list(genomeAxis, plusStrand), minBase = 30450000, maxBase = 30550000)
}
```
geneRegionBiomart

*Construct an AnnotationTrack object from biomaRt.*

**Description**

This function constructs an AnnotationTrack object from Biomart. It is a convenience function.

**Usage**

```r
geneRegionBiomart(chr, start, end, strand, biomart, dp = NULL, chrFunction = function(x) x, strandFunction = function(x) x)
```

**Arguments**

- `chr` chr An integer
- `start` start The start location
- `end` end The end location
- `strand` strand An integer -1, 0, 1
- `biomart` biomart A mart
- `dp` dp DisplayPars object
- `chrFunction` chrFunction A function which takes chr and converts it into the correct representation for biomaRt. For instance yeast likes to have chromosomes as roman numerals so you can use as.roman here.
- `strandFunction` strandFunction Analogous to chrFunction, but for strand. The internal representation of strand is -1,0,1 whereas biomaRt has different species dependent representations.

**Value**

An AnnotationTrack object.

**Author(s)**

James Bullard

---

**GenericArray-class**

*Class "GenericArray", representing array data*

**Description**

The Generic Array class is a class that can be used to create plots from array data such as microarrays and arrayCGH platforms. It can represent, the data as line plots or dot plots and segments can be included as well.

**Objects from the Class**

Objects can be created by calls of the form `new("GenericArray", ...)`. 
GenomeAxis-class

Class "GenomeAxis", representing a genomic coordinate axis

Description

Represents a genomic coordinate axis

Objects from the Class

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

Slots

add53: Object of class "logical", indicating if 5 to 3 prime direction needs to be plotted
add35: Object of class "logical", indicating if 3 to 5 prime direction needs to be plotted
dp: Object of class "DisplayPars", containing the display parameters such as size of the plot and
LittleTicks: Object of class "logical", indicating if the genome axis should be dense for im-
proved locating of regions of interest.

Methods

No methods defined with class "GenomeAxis" in the signature.

Author(s)

Steffen Durinck

References

http://www.stat.berkeley.edu/~steffen/

See Also

objects to See Also as gdPlot

Examples

if(interactive()){
  mart = useMart("ensembl", dataset="hsapiens_gene_ensembl")
  genomeAxis = new("GenomeAxis", add53=TRUE)
  plusStrand = new("GeneRegion", chromosome = "17", start = 30450000, end = 30550000, strand = "+", biomart = mart)
  gdPlot(list(genomeAxis, plusStrand), minBase = 30450000, maxBase = 30550000)
}

getGenomicRange Retrieves the genomic range of an object

Description

getGenomicRange returns the genomic range of an object

Methods

signature(obj = "BaseTrack") #to be added
signature(obj = "ExonArray") #to be added
signature(obj = "gdObject") #to be added
signature(obj = "Gene") #to be added
signature(obj = "GeneRegion") #to be added
signature(obj = "GenericArray") #to be added
signature(obj = "Transcript") #to be added
signature(obj = "TranscriptRegion") #to be added
getPar

*Retrieves a display parameter from an object.*

**Description**
Retrieves a display parameter from an object.

**Usage**
```
getPar(obj, name, ...)
```

**Arguments**
- **obj** A gdObject or DisplayPars object.
- **name** Name of parameter to return.
- **...** Ignored

**Examples**
```
a <- new("GenomeAxis")
getPar(a, "size")
```

getSize

*gets the size*

**Description**
Gets the size display parameter

**Usage**
```
getSize(obj, ...)
```

**Arguments**
- **obj** An object, usually a gdObject.
- **...** Ignored

**Examples**
```
#to be added
```
Class "HighlightRegion" is used to highlight vertical blocks of genomic regions.

Description

HighlightRegion is used to highlight a genomic region of interest. The class offers the ability to highlight or block out regions of interest.

Objects from the Class

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

Slots

- **start**: Object of class "numeric" genomic start position.  
- **end**: Object of class "numeric" genomic end position.  
- **region**: Object of class "numericOrNull" start and end number of the tracks to be covered by the region. These start from the first track (top = 1) to the last track: `length(gdObjects)` in the call to `gdObject`  
- **coords**: Object of class "character" can be either "genomic" or "absolute". If the coordinates are "absolute" then one can plot things using the coordinate space defined by: lower-left (0,0) upper-right (1,1). In this case, start = x0, end = x1 and then region = (y0, y1). See the examples for more details.  
- **dp**: Object of class "DisplayPars" specifies the various display parameters.

Extends

Class "gdObject", directly.

Methods

No methods defined with class "HighlightRegion" in the signature.

Author(s)

James Bullard

Examples

```r
if (interactive()) {
  data("exampleData", package="GenomeGraphs")

  ga <- new("GenomeAxis")
  grF <- new("GeneRegion", start = 10000, end = 20000, chromosome = "I", strand = "+", biomart = yeastMart)
  grR <- new("GeneRegion", start = 10000, end = 20000, chromosome = "I", strand = "-", biomart = yeastMart)
  bt <- new("BaseTrack", base = yeastCons1[,1], value = yeastCons1[,2])
  hr1 <- new("HighlightRegion", start = 11000, end = 13000,
             dp = DisplayPars(alpha = 1, color = "red", lty = "dashed", lwd = 3))
  hr2 <- new("HighlightRegion", start = 15900, end = 16500)

  gdPlot(list(grF, ga, grR, bt), highlightRegions = list(hr1, hr2))
}
```
Ideogram-class

Class "Ideogram", represent an Ideogram

Description
An ideogram is a representation of a chromosome containing the banding pattern. Note that currently ideograms are only available for hsapiens.

Objects from the Class
Objects can be created by calls of the form `new("Ideogram", ...)`. 

Slots
- `chromosome`: Object of class "character", representing the chromosome that needs to be drawn. E.g. 3 if chromosome 3 needs to be drawn or Y for Y chromosome.
- `dp`: Object of class "DisplayPars", can be used to specify the size (default 1) of the ideogram in the final plot and to specify the highlighting color

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

Author(s)
Steffen Durinck

References
http://www.stat.berkeley.edu/~steffen/

See Also
objects to See Also as `gdPlot`

Examples
```r
if(interactive()){ 
data("exampleData", package="GenomeGraphs")

minbase <- 180292097
maxbase <- 180492096
ideog <- new("Ideogram", chromosome = "3")
expres <- new("GenericArray", intensity = intensity, probeStart = exonProbePos,
  dp = DisplayPars(color="darkred", type="point"))
gdPlot(list(ideog, expres), minBase = minbase, maxBase = maxbase) 
}
```
ideogramTab

Contains info to plot ideograms

Description

Contains info to plot ideograms

Format

The format is: chr "ideogramTab"

Source

NCBI

Examples

data(ideogramTab)
## maybe str(ideogramTab) ; plot(ideogramTab) ...

ImplementsTrackOverlay-class

Class "ImplementsTrackOverlay"

Description

The interface to be implemented to overlay tracks.

Objects from the Class

This object should not be instantiated, but rather this class should be extended to implement a particular interface.

Slots

trackOverlay: Object of class "TrackOverlayOrNull"

Methods

No methods defined with class "ImplementsTrackOverlay" in the signature.

Examples

showClass("ImplementsTrackOverlay")
Legend-class

Description
Contains dummy intensity data

Examples
```
#
```

Legend-class
Class "Legend", represents a legend to add to a plot

Description
This class represents a legend

Objects from the Class
Objects can be created by calls of the form `new("Legend", ...)`.

Slots
- `legend`: Object of class "character", vector with names of the items in the legend
- `dp`: Object of class "DisplayPars" size of the legend (size), the size of the font (cex) and the colors (color) of the legend

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

Author(s)
Steffen Durinck

References
http://www.stat.berkeley.edu/~steffen/

See Also
objects to See Also as `gdPlot`

Examples
```
showClass("Legend")
```
makeAnnotationTrack  

Create objects of class AnnotationTrack

Description

Convenience function for constructing objects of class AnnotationTrack.

Usage

makeAnnotationTrack(regions = NULL, chr = NULL, strand = NULL, start = NULL, end = NULL, feature = NULL, group = NULL, ID = NULL, dp = NULL)

Arguments

- **regions**: A dataframe with columns start, end, feature, group, ID. start and end delineate the boundaries of the boxes. feature can be used to color the boxes. Group denotes linking so generally exons from a gene form a group. Finally, ID can be used to plot names on boxes.
- **chr**: The chromosome of the regions (can be ignored)
- **strand**: The strand of the regions (can be ignored)
- **start**: If regions is missing then we construct a dataframe from the remaining parameters.
- **end**: Construct regions with this vector
- **feature**: Construct regions with this feature vector or scalar
- **group**: Defines a grouping
- **ID**: Defines an ID for each annotation bit
- **dp**: DisplayPars, in this case we can create a mapping between feature and color. So lets say in the feature column you have: gene, transcript, gene, then in the dp you can say gene = 'blue' and transcript = 'green'

Value

Returns an object of class AnnotationTrack

Examples

```r
a <- makeAnnotationTrack(start = c(10, 15, 25), end = c(12, 19, 31),
                          group = c(1,1,2), feature = c("gene", "gene", "tf"),
                          ID = paste("id", 1:3, sep = ""), dp = DisplayPars(gene = 'blue'))
gdPlot(a, minBase = 0, maxBase = 40)
```
makeBaseTrack

Creates an object of class BaseTrack

Description

Creates an object of class BaseTrack, which can represent many datasets containing a base given by a vector of positions and a corresponding vector with values for these base positions.

Usage

makeBaseTrack(base, value, strand, trackOverlay, dp = NULL)

Arguments

base Numeric vector of base positions
value Numeric vector with values for these base positions
strand Character either + or - representing the strand
trackOverlay Object of class TrackOverlay, used when overlays are needed to be drawn
dp Object of class DisplayPars representing the display parameters of the plot

Value

Object of class BaseTrack

Author(s)

Jim Bullard and Steffen Durinck

References

~put references to the literature/web site here~

See Also

DisplayPars, gdPlot

Examples

### Should be DIRECTLY executable !! ----
### --> Define data, use random, 
###---or do help(data=index) for the standard data sets.

## The function is currently defined as
function (base, value, strand, segmentation, dp = NULL)
{
  pt <- getClass("BaseTrack")@prototype
  if (is.null(dp))
    dp <- pt@dp
  if (missing(strand))
    strand <- pt@strand
  if (missing(segmentation))
    segmentation <- pt@segmentation
}
if (missing(base))
    stop("Need base argument to know the base positions to plot the data on the genome")
if (missing(value))
    stop("Need value argument")
new("BaseTrack", base = base, value = value, strand = strand,
    dp = dp, segmentation = segmentation)
}

makeExonArray  Creates and object of class ExonArray

Description

Creates an object of class ExonArray, representing exon array microarray data

Usage

makeExonArray(intensity, probeStart, probeEnd, probeId, nProbes, displayProbesets = FALSE, dp = NULL)

Arguments

intensity  Matrix of intensities, probes in the rows, samples in the columns
probeStart  Vector of probe start positions
probeEnd  Vector of probe end positions (optional)
probeId  Character vector containing the probe identifiers
nProbes  Vector indicating how many probes are in each probeset
displayProbesets  Logical indicating if the probeset identifier should be displayed or not
dp  Object of class DisplayPars to set the display parameters

Value

Object of ExonArray class

Author(s)

Steffen Durinck and Jim Bullard

References

~put references to the literature/web site here ~

See Also

gdPlot
**Examples**

```r
## Should be DIRECTLY executable !! ----
##-- ==> Define data, use random,
##--or do help(data=index) for the standard data sets.

# The function is currently defined as
function (intensity, probeStart, probeEnd, probeId, nProbes, 
  displayProbesets = FALSE, dp = NULL)
{
  pt <- getClass("ExonArray")@prototype
  if (is.null(dp))
    dp <- pt@dp
  if (missing(probeEnd))
    probeEnd <- pt@probeEnd
  if (missing(probeId))
    probeId <- pt@probeId
  if (missing(nProbes))
    nProbes <- pt@nProbes
  if (is.null(dp))
    dp <- getClass("ExonArray")@prototype@dp
  new("ExonArray", intensity = intensity, probeStart = probeStart, 
      probeEnd = probeEnd, probeId = probeId, nProbes = nProbes, 
      displayProbesets = displayProbesets, dp = dp)
}

makeGene
```

---

**makeGene**

*Creates an object of class Gene*

**Description**

Creates an object of class Gene. This represents a gene structure as annotated in Ensembl.

**Usage**

```r
makeGene(id, type, biomart, dp = NULL)
```

**Arguments**

- **id**: An identifier used to specify of which gene the intron-exon structure should be retrieved
- **type**: The type of identifiers used, examples are `ensembl\_gene\_id`, `hgnc\_symbol`, `entrezgene`. See `listAttributes` function of the `biomaRt` package for more info
- **biomart**: Mart object, created by the `useMart` function of `biomaRt`
- **dp**: object of class `DisplayPars`, determines the display of features on the plot

**Value**

An object of class Gene

**Author(s)**

Steffen Durinck and Jim Bullard
## makeGeneModel

Create an object of class GeneModel

### Usage

```r
makeGeneModel(start, end, chromosome, dp = NULL)
```

### Arguments

- `start`: Vector of start positions for exons
- `end`: Vector of end positions for exons
- `chromosome`: chromosome name
- `dp`: Display parameters represented as an object of class DisplayPars

### Value

Object of class GeneModel

### Author(s)

Steffen Durinck and Jim Bullard
References

~put references to the literature/web site here ~

See Also

DisplayPars

Examples

### Should be DIRECTLY executable !! ===
###-- Define data, use random,
###--or do help(data=index) for the standard data sets.

### The function is currently defined as
function (start, end, chromosome, dp = NULL)
{
  if (is.null(dp))
    dp <- getClass("GeneModel")@prototype@dp
  new("GeneModel", exonStart = start, exonEnd = end, dp = dp)
}

makeGeneRegion

Creates an object of class Gene containing the intron-exon structures of genes

Description

Creates an object of class Gene containing the intron-exon structures of genes. Given a start and end position, strand and chromosome, all the intron-exon structures of all genes laying in this region will be retrieved.

Usage

makeGeneRegion(start, end, chromosome, strand, biomart, dp = NULL)

Arguments

start  Start position on chromosome
end    End position on chromosome
chromosome  Chromosome name
strand  Strand either + or -
biomart  Mart object, created by the useMart function of biomaRt
dp      Object of class DisplayPars, determines the display of features on the plot

Value

An object of class Gene

Author(s)

Steffen Durinck and Jim Bullard
makeGenericArray

References
~put references to the literature/web site here~

See Also
gdPlot

Examples

### Should be DIRECTLY executable !! ----
###-- ==> Define data, use random,
###--or do help(data=index) for the standard data sets.

## The function is currently defined as
function (start, end, chromosome, strand, biomart, dp = NULL) {
if (missing(start))
  stop("Need to specify a start for creating a GeneRegion")
pt <- getClass("GeneRegion")@prototype
if (is.null(dp))
  dp <- pt@dp
if (is.numeric(chromosome))
  chromosome = as.character(chromosome)
new("GeneRegion", start = start, end = end, chromosome = chromosome,
    strand = strand, biomart = biomart, dp = dp)
}

makeGenericArray Creates an object of class GenericArray

Description

Creates an object of class Generic Array representing microarray data. This could be gene expression, array CGH, etc.

Usage

makeGenericArray(intensity, probeStart, probeEnd, trackOverlay, dp = NULL)

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>intensity</td>
<td>Matrix of intensities, probes in the rows, samples in the columns</td>
</tr>
<tr>
<td>probeStart</td>
<td>Vector of start positions for the probes</td>
</tr>
<tr>
<td>probeEnd</td>
<td>Vector of end positions for probes (optional)</td>
</tr>
<tr>
<td>trackOverlay</td>
<td>Object of class TrackOverlay, needs to be added if overlays should be plotted as well</td>
</tr>
<tr>
<td>dp</td>
<td>Object of class DisplayPars which handles the display parameters for plotting</td>
</tr>
</tbody>
</table>

Value

Object of class GenericArray
Author(s)
Jim Bullard and Steffen Durinck

References
BMC bioinformatics 2009

See Also
gdPlot

Examples
showClass("GenericArray")

Description
Creates an object of class GenomeAxis, representing a genome coordinate axis.

Usage
makeGenomeAxis(add53 = FALSE, add35 = FALSE, littleTicks = FALSE, dp = NULL)

Arguments
add53  Add a 5 to 3 prime label
add35  Add a 3 to 5 prime label
littleTicks  Add smaller ticks between larger ticks
dp  Set the display parameters see DisplayPars

Value
Object of class GenomeAxis

Author(s)
Jim Bullard and Steffen Durinck

References
~put references to the literature/web site here ~

See Also
DisplayPars, gdPlot
Examples

### Should be DIRECTLY executable !! ----
### ==> Define data, use random,
###--or do help(data=index) for the standard data sets.

## The function is currently defined as
function (add53 = FALSE, add35 = FALSE, littleTicks = FALSE, 
          dp = NULL)
{
  if (is.null(dp))
    dp <- getClass("GenomeAxis")@prototype@dp
  new("GenomeAxis", add53 = add53, add35 = add35, dp = dp)
}

makeIdeogram

Creates object of class Ideogram

Description

Creates object of class Ideogram

Usage

makeIdeogram(chromosome, dp = NULL)

Arguments

chromosome      Chromosome to represent (currently human only)
dp              Display parameters such as color and size

Value

Object of class Ideogram

Author(s)

Jim Bullard and Steffen Durinck

References

~put references to the literature/web site here ~

See Also

gdPlot
**Examples**

```r
# Should be DIRECTLY executable !! ----
#-- ==> Define data, use random,
#-- or do help(data=index) for the standard data sets.

## The function is currently defined as
function (chromosome, dp = NULL)
{
  if (missing(chromosome))
    stop("Need to specify chromosome for creating an Ideogram")
  if (is.numeric(chromosome)) {
    chromosome = as.character(chromosome)
  }
  if (is.null(dp))
    dp <- getClass("Ideogram")@prototype@dp
  new("Ideogram", chromosome = chromosome, dp = dp)
}
```

---

**makeLegend**

*Creates an object of class Legend*

**Description**

Creates an object of class Legend which can be used to plot a legend

**Usage**

```r
makeLegend(text, fill, cex)
```

**Arguments**

- `text` Vector of characters representing the legend
- `fill` Vector of colors to fill the legend boxes
- `cex` Font size of the legend

**Value**

Object of class Legend

**Author(s)**

Jim Bullard and Steffen Durinck

**References**

~put references to the literature/web site here ~

**See Also**

See Also as `gdPlot`
### Examples

```r
##-- Should be DIRECTLY executable !! ----
##-- ==> Define data, use random,
##--or do help(data=index) for the standard data sets.

## The function is currently defined as
function (text, fill, cex)
{
  dp <- getClass("Legend")@prototype@dp
  if (!missing(cex))
    setPar(dp, "cex", cex)
  if (!missing(fill))
    setPar(dp, "color", fill)
  new("Legend", legend = text, dp = dp)
}
```

---

**makeRectangleOverlay**  
*Create a rectangular overlay*

### Description

Construct rectangular overlays.

### Usage

```r
makeRectangleOverlay(start, end, region = NULL, coords = c("genomic", "absolute"), dp = NULL)
```

### Arguments

- **start**: Start position in coords coordinates
- **end**: End position in coords coordinates
- **region**: Which tracks to span, or the y (vertical range)
- **coords**: Which coordinate system to use, if absolute then the range is from 0,1 and region become the y coordinates
- **dp**: The display parameters

### Details

The rectangular overlay can be used to plot overlays in either genomic or absolute coordinates. If coordinates are absolute then the region argument becomes the y arguments.

### Value

An object of class RectangleOverlay

### Examples

```r
data("exampleData", package = "GenomeGraphs")
cop <- makeGenericArray(intensity = cn, probeStart = probestart,
  dp = DisplayPars(size=3, color = "seagreen", type="dot"))
gdPlot(list(makeGenomeAxis(), cop), overlays =
  makeRectangleOverlay(start = 180350000, end = 180350000 + 1e5, dp = DisplayPars(alpha = .3)))
```
makeSegmentation  

Create objects of class segmentation

Description

Construct objects of class segmentation

Usage

makeSegmentation(start, end, value, dp = NULL)

Arguments

start  
Either a list or a vector. If it is a list then it is a list of vectors of start position (this is the way it is represented in the segmentation class) If it is a vector it is a vector of start positions.

end  
Same as start, but the corresponding end positions.

value  
The y value of the segmentation, ie. segments(start[i], value[i], end[i], value[i])

dp  
The Display parameters.

Value

An object of class Segmentation

Examples

data("exampleData", package="GenomeGraphs")
seg <- makeSegmentation(segStart[[1]], segEnd[[1]], segments[[1]],
dp = DisplayPars(color = "black", lwd=2,lty = "solid"))
cop <- makeGenericArray(intensity = cn, probeStart = probestart,
trackOverlay = seg, dp = DisplayPars(size=3, color = "seagreen", type="dot"))
gdPlot(cop)

makeSmoothing  

Create objects of class Smoothing

Description

Construct objects of class Smoothing

Usage

makeSmoothing(x, y, dp = NULL)

Arguments

x  
x-coordinate

y  
y-coordinate

dp  
The Display parameters.
Value

An object of class Smoothing

Examples

data("exampleData", package="GenomeGraphs")
seg <- makeSmoothing(probestart, lowess(probestart, cn)$y, dp = DisplayPars(color = "black", lwd=2,lty = "solid")
cop <- makeGenericArray(intensity = cn, probeStart = probestart, trackOverlay = seg, dp = DisplayPars(size=3, color = "seagreen", type="dot"))
gdPlot(cop)

makeTextOverlay  Create objects of class TextOverlay

Description

Create objects of class TextOverlay

Usage

makeTextOverlay(text, xpos, ypos, region = NULL, coords = c("genomic", "absolute"), dp = NULL)

Arguments

text The text to plot
xpos The xposition of the text
ypos The yposition of the text
region Region
coords Coordinates
dp The display parameters

Value

Returns class of TextOverlay

Examples

data("exampleData", package="GenomeGraphs")
seg <- makeSegmentation(segStart[[1]], segEnd[[1]], segments[[1]], dp = DisplayPars(color = "black", lwd=2,lty = "solid")
cop <- makeGenericArray(intensity = cn, probeStart = probestart, trackOverlay = seg, dp = DisplayPars(size=3, color = "seagreen", type="dot"))
gdPlot(cop, overlay = makeTextOverlay("Overlay Text", xpos = .5, ypos = .5, coords = "absolute"))
makeTitle

Creates an object of class Title

Description

Creates an object of class Title which can be used to add a title to the plot

Usage

makeTitle(text, cex, color, size)

Arguments

text The text that will make up the title
cex Font size of the title
color Font color of the title
size Size of the viewport in which the title resides

Value

Object of class Title

Author(s)

Steffen Durinck and Jim Bullard

References

~put references to the literature/web site here ~

See Also

gdPlot

Examples

```r
## Should be DIRECTLY executable !! ----
##-- ==> Define data, use random, 
##-- or do help(data=index) for the standard data sets.

## The function is currently defined as
function (text, cex, color, size)
{
  dp <- getClass("Title")@prototype@dp
  if (!missing(cex))
    setPar(dp, "cex", cex)
  if (!missing(color))
    setPar(dp, "color", color)
  if (!missing(size))
    setPar(dp, "size", size)
  new("Title", title = text, dp = dp)
}
```
makeTranscript

Creates an object of class Transcript

Description

Creates an object of class Transcript. This represents all known transcript structures in Ensembl.

Usage

makeTranscript(id, type, biomart, dp = NULL)

Arguments

- **id**: An identifier used to specify of which gene/transcript the transcript structures should be retrieved.
- **type**: The type of identifiers used, examples are `ensembl\_gene\_id`, `hgnc\_symbol`, `entrezgene`. See `listAttributes` function of the `biomaRt` package for more info.
- **biomart**: Mart object, created by the `useMart` function of `biomaRt`.
- **dp**: object of class `DisplayPars`, determines the display of features on the plot.

Value

An object of class Transcript

Author(s)

Steffen Durinck and Jim Bullard

References

~put references to the literature/web site here ~

See Also

gdPlot

Examples

```R
### Should be DIRECTLY executable !! ----
###-- ==> Define data, use random,  
###--or do help(data=index) for the standard data sets.

## The function is currently defined as
function (id, type, biomart, dp = NULL)
{
  if (missing(id))
    stop("Need to specify a gene identifier for creating a Transcript")
  pt <- getClass("Transcript")@prototype
  if (is.null(dp))
    dp <- pt@dp
  if (missing(type))
    type = pt@type
```
new("Transcript", id = id, type = type, biomart = biomart, 
    dp = dp)
)

--

MappedRead-class Represents mapped reads

Description

Represents mapped reads

Slots

start: Object of class "numeric", containing start position of the reads
dp: Object of class "DisplayPars".
end: Object of class "numeric", containing end position of the reads
strand: Object of class "numeric", containing strand to which the reads map
chromosome: Object of class "numeric", containing chromosome to which the reads map

Methods

show signature(object = "MappedRead"):

Author(s)

Steffen Durinck

References

http://www.stat.berkeley.edu/~steffen/

Examples

## maybe str(MappedRead) ; plot(MappedRead) ... 

--

Overlay-class Class "Overlay"

Description

Superclass of overlay objects.

Objects from the Class

Objects from this class are generally not created.

Slots

dp: Object of class "DisplayPars"
Extends
Class "gdObject", directly.

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

Examples
showClass("Overlay")

Description
Contains dummy expression array probe start positions

Examples
#

RectangleOverlay-class
Class "RectangleOverlay"

Description
Rectangular Overlay

Objects from the Class
Objects can be created by calls of the form makeRectangleOverlay (makeRectangleOverlay).

Slots
start: Object of class "numeric"
end: Object of class "numeric"
region: Object of class "numericOrNull"
coords: Object of class "character"
dp: Object of class "DisplayPars"

Extends
Class "Overlay", directly. Class "gdObject", by class "Overlay", distance 2.

Methods
drawOverlay signature(obj = "RectangleOverlay"): ...
Examples

showClass("RectangleOverlay")

segEnd

Contains dummy copy number segmentation end positions

Description

Contains dummy copy number segmentation end positions

Examples

#

Segmentation-class

Class "Segmentation" is used to specify segmentations to any class that extends Segmentable (GenericArray, BaseTrack)

Description

A Segmentation object provides line segments to various gdObjects

Objects from the Class

Objects can be created by calls of the form new("Segmentation", segments = list(1), segmentStart = list(1000), segmentEnd = list(1010))

Slots

segments: Object of class "list"

segmentStart: Object of class "list"

segmentEnd: Object of class "list"

dp: Object of class "DisplayPars"

Extends

Class "gdObject", directly.

Methods

getSegmentEnd signature(obj = "Segmentation"): ...

getSegmentStart signature(obj = "Segmentation"): ...

getSegments signature(obj = "Segmentation"): ...

Author(s)

James Bullard

Examples

showClass("Segmentation")
segments

Contains dummy copy number segment data

Description
Contains dummy copy number segment data

Examples
#

segStart
Contains dummy copy number segmentation start positions data

Description
Contains dummy copy number segmentation start positions

Examples
#

seqDataEx
This is an example data set from chromosome 4 of yeast from various publicly available datasets.

Description
This was a small dataset constructed from publicly available datasets. Please see references for details.

Usage
data(seqDataEx)

Format
data("seqDataEx", package = "GenomeGraphs") names(seqDataEx)

References
Ugrappa Nagalakshmi et. al. The transcriptional landscape of the yeast genome defined by RNA sequencing. Science, 2008
Adam Siepel, et. al. Evolutionarily conserved elements in vertebrate, insect, worm, and yeast genomes. Genome Res, 2005
showDisplayOptions

Examples
data(seqDataEx)

setPar                         Sets a display parameter

Description
Sets a display parameter

Usage
setPar(obj, name, val, ...)

Arguments
- obj: An object, usually a gdObject.
- name: Name of display parameter to set.
- val: Value of display parameter.
- ...: Ignored

Examples
a <- new("GenomeAxis")
setPar(a, "size", 100)
gdPlot(a, minBase = 10, maxBase = 10000)

showDisplayOptions
Print standard display options, DisplayPars for an object or a class

Description
Prints the available display options for a class or name of a class.

Usage
showDisplayOptions(obj, ...)

Arguments
- obj: Either an object of subclass gdObject or a character naming a class
- ...: Dots

Value
Returns a DisplayPars object which is generally printed to the screen.

Examples
showDisplayOptions("GenericArray")
Smoothing-class

Class "Smoothing"

Description
Simple object to overlay line segments specified by x,y coordinates.

Objects from the Class
Objects can be created by calls of the form makeSmoothing.

Slots
x: Object of class "numeric"
y: Object of class "numeric"

dp: Object of class "DisplayPars"

Extends
Class "TrackOverlay", directly. Class "gdObject", by class "TrackOverlay", distance 2. Class "TrackOverlayOrNull", by class "TrackOverlay", distance 2.

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

Examples
showClass("Smoothing")

TextOverlay-class

Class "TextOverlay"

Description
Textual overlay classes

Objects from the Class
Objects can be created by calls of the form makeTextOverlay

Slots
text: Object of class "character"
xpos: Object of class "numeric"
ypos: Object of class "numeric"

region: Object of class "numericOrNull"
coords: Object of class "character"

dp: Object of class "DisplayPars"
Title-class

Extends
Class "Overlay", directly. Class "gdObject", by class "Overlay", distance 2.

Methods

drawOverlay signature(obj = "TextOverlay"): ...

Examples

showClass("TextOverlay")

Title-class

Class "Title" representing the title of a plot

Description
Represent the title of a plot

Objects from the Class
Objects can be created by calls of the form new("Title", ...).

Slots

title: Object of class "character" which will be used as title
dp: Object of class "DisplayPars" specifying the size and color of the title in the final plot

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

Author(s)
Steffen Durinck

References
http://www.stat.berkeley.edu/~steffen/

See Also
objects to See Also as gdPlot

Examples

showClass("Title")
**TrackOverlay-class**

**Class** "TrackOverlay"

**Description**

Parent class for track overlay objects, such as Smoothing and Segmentation.

**Objects from the Class**

Objects of this class are not instantiated, but rather this class should be extended.

**Slots**

- **dp**: Object of class "DisplayPars".

**Extends**

Class "gdObject", directly. Class "TrackOverlayOrNull", directly.

**Methods**

No methods defined with class "TrackOverlay" in the signature.

**Examples**

`showClass("TrackOverlay")`

---

**Transcript-class**

Represent known transcript isoforms as annotated by Ensembl

**Description**

Represent known transcript isoforms as annotated by Ensembl

**Objects from the Class**

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

**Slots**

- **id**: Object of class "character", represents the gene identifier that should be used to retrieve the transcript level annotation.
- **type**: Object of class "character", represents the type of identifiers used to specify the gene e.g. hgnc\_symbol, entrezgene and ensembl\_gene\_id
- **transcriptSize**: Object of class "numeric", represents the size of the transcripts in the plot
- **numOfTranscripts**: Object of class "numeric", should not be used by users
- **biomart**: Object of class "Mart", containing the links to the Ensembl database. This object should be created with the useMart function of the biomaRt package
- **ens**: Object of class "data.frame", should not be used by the users. Contains the output from the biomaRt query
Methods

\begin{itemize}
  \item \textbf{drawGD} signature(.Object = "Transcript"): ...
  \item \textbf{initialize} signature(.Object = "Transcript"): ...
  \item \textbf{show} signature(object = "Transcript"): ...
\end{itemize}

Author(s)

Steffen Durinck

References

http://www.stat.berkeley.edu/~steffen/

See Also

objects to See Also as \texttt{gdPlot}

Examples

\begin{verbatim}
if(interactive()){
  data("unrData", package="GenomeGraphs")
  mart = useMart("ensembl", dataset="hsapiens_gene_ensembl")
  transcript = new("Transcript", id = "ENSG00000000091307", biomart = mart)
  gdPlot(list(transcript), minBase = min(exon@probeStart),
         maxBase = max(exon@probeEnd))
}
\end{verbatim}

---

**TranscriptRegion-class**

\textit{Class "TranscriptRegion", representing a genomic region with transcripts}

Description

Upon creation of this object, transcripts present in a specified region will be retrieved from Ensembl.

Objects from the Class

Objects can be created by calls of the form \texttt{new("TranscriptRegion", ...)}

Slots

- \texttt{start}: Object of class "numeric", the start base of the genomic region
- \texttt{end}: Object of class "numeric", the end base of the genomic region
- \texttt{chromosome}: Object of class "character", the chromosome
- \texttt{biomart}: Object of class "Mart", contains link to Ensembl and should be created using the useMart function of the biomaRt package
- \texttt{ens}: Object of class "data.frame", users should not specify this, it contains the output of the query to Ensembl
**unrData**

**Methods**

```r
show signature(object = "TranscriptRegion"): ...
```

**Author(s)**

Steffen Durinck

**References**

http://www.stat.berkeley.edu/~steffen/

**See Also**

objects to See Also as **gdPlot**

**Examples**

```r
showClass("TranscriptRegion")
```

---

**unrData**

Contains exon array data

**Description**

Contains exon array data from the publically available dataset on human tissue panels, given by Affymetrix. The data was contributed to the package by Elizabeth Purdom.

**Examples**

```r
#
```

---

**unrNProbes**

Contains exon array data

**Description**

Contains the number of probes per exon array probeset id from the publically available dataset on human tissue panels, given by Affymetrix. The data was contributed to the package by Elizabeth Purdom.

**Examples**

```r
#
```
<table>
<thead>
<tr>
<th>unrPositions</th>
<th>Contains probe start and end positions of exon array probes</th>
</tr>
</thead>
</table>

**Description**

Contains probe start and end positions from the publically available dataset on human tissue panels, given by Affymetrix. The data was contributed to the package by Elizabeth Purdom.

**Examples**

```r
#
```

<table>
<thead>
<tr>
<th>yeastCons1</th>
<th>Contains dummy yeast conservation data</th>
</tr>
</thead>
</table>

**Description**

Contains dummy yeast base conservation data.

**Examples**

```r
#
```
Index

*Topic **classes**
  AnnotationTrack-class, 3
  BaseTrack-class, 3
  DisplayPars-class, 6
  drawTrackOverlay-methods, 7
  ExonArray-class, 8
  gdObject-class, 9
  Gene-class, 11
  GeneModel-class, 13
  GeneRegion-class, 14
  GenericArray-class, 15
  GenomeAxis-class, 16
  HighlightRegion-class, 19
  Ideogram-class, 20
  ImplementsTrackOverlay-class, 21
  Legend-class, 22
  Overlay-class, 38
  RectangleOverlay-class, 39
  Segmentation-class, 40
  Smoothing-class, 43
  TextOverlay-class, 43
  Title-class, 44
  TrackOverlay-class, 45
  Transcript-class, 45
  TranscriptRegion-class, 46

*Topic **datasets**
  cn, 4
  exonProbePos, 9
  ideogramTab, 21
  intensity, 22
  MappedRead-class, 38
  probestart, 39
  segEnd, 40
  segments, 41
  segStart, 41
  seqDataEx, 41
  unrData, 47
  unrNProbes, 47
  unrPositions, 48
  yeastCons1, 48

*Topic **hplot**
  DisplayPars, 5
  drawGD, 7
  gdPlot, 10
  geneBiomart, 12
  geneRegionBiomart, 15
  getPar, 18
  getSize, 18
  makeAnnotationTrack, 23
  makeBaseTrack, 24
  makeExonArray, 25
  makeGene, 26
  makeGeneModel, 27
  makeGeneRegion, 28
  makeGenericArray, 29
  makeGenericRegion, 30
  makeImage, 31
  makeLegend, 32
  makeRectangleOverlay, 33
  makeSegmentation, 34
  makeSmoothing, 34
  makeTextOverlay, 35
  makeTitle, 36
  makeTranscript, 37
  setPar, 42
  showDisplayOptions, 42

*Topic **methods**
  drawTrackOverlay-methods, 7
  getGenomicRange, 17
  AnnotationTrack-class, 3
  BaseTrack-class, 3
  cn, 4
  DisplayPars, 5, 24, 28, 30
  DisplayPars-class, 6
  drawGD, 7
  drawGD, AnnotationTrack-method (AnnotationTrack-class), 3
  drawGD, BaseTrack-method (BaseTrack-class), 3
  drawGD, ExonArray-method (ExonArray-class), 8
  drawGD, Gene-method (Gene-class), 11
  drawGD, GeneModel-method (GeneModel-class), 13
INDEX

drawGD, GeneRegion-method
  (GeneRegion-class), 14
drawGD, GenericArray-method
  (GenericArray-class), 15
drawGD, GenomeAxis-method
  (GenomeAxis-class), 16
drawGD, Ideogram-method
  (Ideogram-class), 20
drawGD, Legend-method
  (Legend-class), 22
drawGD, MappedRead-method
  (MappedRead-class), 38
drawGD, Segmentation-method
  (Segmentation-class), 40
drawGD, Transcript-method
  (Transcript-class), 45
drawOverlay, TextOverlay-method
  (TextOverlay-class), 43
drawOverlay, RectangleOverlay-method
  (RectangleOverlay-class), 39
drawTrackOverlay, Segmentation-method
  (drawTrackOverlay-methods), 7
drawTrackOverlay, Smoothing-method
  (drawTrackOverlay-methods), 7
drawTrackOverlay-methods, 7
ExonArray-class, 8
exonProbePos, 9
gdObject, 3, 4, 8, 19, 39, 40, 43–45
gdObject-class, 9
gdPlot, 4, 8, 10, 12–14, 16, 17, 20, 22, 24, 25, 27, 29–32, 36, 37, 44, 46, 47
Gene-class, 11
geneBiomart, 12
GeneModel-class, 13
GeneRegion-class, 14
geneRegionBiomart, 15
GenericArray-class, 15
GenomeAxis-class, 16
getCode, gdObject-method
  (gdObject-class), 9
ggetColor, gdObject-method
  (gdObject-class), 9
getGenomicRange, 17
getGenomicRange, BaseTrack-method
  (getGenomicRange), 17
getGenomicRange, ExonArray-method
  (getGenomicRange), 17
getGenomicRange, gdObject-method
  (getGenomicRange), 17
getGenomicRange, Gene-method
  (getGenomicRange), 17
getGenomicRange, GeneRegion-method
  (getGenomicRange), 17
getGenomicRange, GenericArray-method
  (getGenomicRange), 17
getGenomicRange, Transcript-method
  (getGenomicRange), 17
getGenomicRange, TranscriptRegion-method
  (getGenomicRange), 17
gtLty, gdObject-method
  (gdObject-class), 9
gtLwd, gdObject-method
  (gdObject-class), 9
gtPar, 18
gtPar, DisplayPars-method
  (DisplayPars-class), 6
gtPar, gdObject-method
  (gdObject-class), 9
getPch, gdObject-method
  (gdObject-class), 9
getPlotId, AnnotationTrack-method
  (AnnotationTrack-class), 3
getPointSize, AnnotationTrack-method
  (AnnotationTrack-class), 3
getSegmentEnd, Segmentation-method
  (Segmentation-class), 40
getSegments, Segmentation-method
  (Segmentation-class), 40
getSegmentStart, Segmentation-method
  (Segmentation-class), 40
getSize, 18
gtSize, gdObject-method
  (gdObject-class), 9
HighlightRegion-class, 19
Ideogram-class, 20
ideogramTab, 21
ImplementsTrackOverlay-class, 21
initialize, AnnotationTrack-method
  (AnnotationTrack-class), 3
initialize, DisplayPars-method
  (DisplayPars-class), 6
initialize, gdObject-method
  (gdObject-class), 9
initialize, Gene-method
  (Gene-class), 11
initialize, GeneRegion-method
  (GeneRegion-class), 14
initialize, Transcript-method
  (Transcript-class), 45
intensity, 22
Legend-class, 22
makeAnnotationTrack, 23
INDEX

makeBaseTrack, 24
makeExonArray, 25
makeGene, 26
makeGeneModel, 27
makeGeneRegion, 28
makeGenericArray, 29
makeGenomeAxis, 30
makeLegend, 32
makeRectangleOverlay, 33, 39
makeSegmentation, 34
makeSmoothing, 34
makeTextOverlay, 35, 43
makeTitle, 36
makeTranscript, 37
MappedRead-class, 38
Overlay, 39, 44
Overlay-class, 38
probestart, 39
RectangleOverlay-class, 39
segEnd, 40
Segmentation-class, 40
segments, 41
segStart, 41
seqDataEx, 41
setPar, 42
setPar, DisplayPars-method
  (DisplayPars-class), 6
setPar, gdObject-method
  (gdObject-class), 9
show, BaseTrack-method
  (BaseTrack-class), 3
show, DisplayPars-method
  (DisplayPars-class), 6
show, ExonArray-method
  (ExonArray-class), 8
show, Gene-method (Gene-class), 11
show, GeneRegion-method
  (GeneRegion-class), 14
show, GenericArray-method
  (GenericArray-class), 15
show, MappedRead-method
  (MappedRead-class), 38
show, Transcript-method
  (Transcript-class), 45
show, TranscriptRegion-method
  (TranscriptRegion-class), 46
showDisplayOptions, 42
showDisplayOptions, character-method
  (gdObject-class), 9
showDisplayOptions, gdObject-method
  (gdObject-class), 9
Smoothing-class, 43
TextOverlay-class, 43
Title-class, 44
TrackOverlay, 43
TrackOverlay-class, 45
Transcript-class, 45
TranscriptRegion-class, 46
unrData, 47
unrNProbes, 47
unrPositions, 48
yeastCons1, 48