

# Package ‘GenomeGraphs’

October 7, 2014

**Version** 1.24.0

**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.

**Collate** GenomeGraphs-classes.R GenomeGraphs-methods.R GenomeGraphs.R Overlay.R

**License** Artistic-2.0

**LazyLoad** yes

## R topics documented:

AnnotationTrack-class . . . . .	3
BaseTrack-class . . . . .	4
cn . . . . .	5
DisplayPars . . . . .	5
DisplayPars-class . . . . .	6
drawGD . . . . .	7
drawTrackOverlay-methods . . . . .	8
ExonArray-class . . . . .	8
exonProbePos . . . . .	9
gdObject-class . . . . .	10

gdPlot . . . . .	11
Gene-class . . . . .	12
geneBiomart . . . . .	13
GeneModel-class . . . . .	14
GeneRegion-class . . . . .	15
geneRegionBiomart . . . . .	16
GenericArray-class . . . . .	17
GenomeAxis-class . . . . .	18
getGenomicRange . . . . .	19
getPar . . . . .	19
getSize . . . . .	20
HighlightRegion-class . . . . .	20
Ideogram-class . . . . .	21
ideogramTab . . . . .	22
ImplementsTrackOverlay-class . . . . .	23
intensity . . . . .	23
Legend-class . . . . .	24
makeAnnotationTrack . . . . .	25
makeBaseTrack . . . . .	26
makeExonArray . . . . .	27
makeGene . . . . .	28
makeGeneModel . . . . .	29
makeGeneRegion . . . . .	30
makeGenericArray . . . . .	32
makeGenomeAxis . . . . .	33
makeIdeogram . . . . .	34
makeLegend . . . . .	35
makeRectangleOverlay . . . . .	36
makeSegmentation . . . . .	37
makeSmoothing . . . . .	37
makeTextOverlay . . . . .	38
makeTitle . . . . .	39
makeTranscript . . . . .	40
MappedRead-class . . . . .	41
Overlay-class . . . . .	42
probstart . . . . .	42
RectangleOverlay-class . . . . .	43
segEnd . . . . .	43
Segmentation-class . . . . .	44
segments . . . . .	44
segStart . . . . .	45
seqDataEx . . . . .	45
setPar . . . . .	46
showDisplayOptions . . . . .	46
Smoothing-class . . . . .	47
TextOverlay-class . . . . .	47
Title-class . . . . .	48
TrackOverlay-class . . . . .	49

<i>AnnotationTrack-class</i>	3
Transcript-class . . . . .	50
TranscriptRegion-class . . . . .	51
unrData . . . . .	52
unrNProbes . . . . .	52
unrPositions . . . . .	52
yeastCons1 . . . . .	53
<b>Index</b>	<b>54</b>

---

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

```
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	<i>Contains dummy copy number data</i>
----	--

---

**Description**

Contains dummy copy number data

**Examples**

#

---

DisplayPars	<i>DisplayPars constructs objects of type DisplayPars which are used to effect the display of gObjects</i>
-------------	--

---

**Description**

DisplayPars takes any number of named arguments which will be used by the drawGD method of the gObject. 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 gObject 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 gObject 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 gObject.

**Author(s)**

James Bullard

**Examples**

```

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(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)

```

---

DisplayPars-class	<i>Class "DisplayPars" is used to specify graphical parameters to gObjects.</i>
-------------------	---

---

**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 gObjects 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 gObject.  
**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 "[gObject](#)", 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**

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

  title = new("Title", title = "ENSG00000009307", 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 = a
  exon2 = new("ExonArray", intensity = unrData, probeStart = unrPositions[,3], probeEnd=unrPositions[,4], probeId =

  affyModel = new("GeneModel", exonStart = unrPositions[,3], exonEnd = unrPositions[,4])
  gene = new("Gene", id = "ENSG00000009307", biomaRt = mart)
  transcript = new("Transcript", id = "ENSG00000009307" , biomaRt = mart)
  legend = new("Legend", legend = c("affyModel", "gene"), dp = DisplayPars(color= c("darkgreen", "orange")))

  gdPlot(list(title, exonarray1 = exon2, exonarray2= exon, AffymetrixModel= affyModel, gene, transcript, legend), min
}
```

---

exonProbePos

*Contains dummy exon probe positions*

---

**Description**

Contains dummy exon probe positions

**Examples**

#

---

gdObject-class      *Class "gdObject" is the parent class of all of the objects in the system.*

---

**Description**

The gdObject is the superclass of all the classes in the system and provides some basic functionality for displaying and managing graphical parameters.

**Objects from the Class**

Objects can be created by calls of the form `new("gdObject", ...)`. Generally, this class is meant to be subclassed and not created directly.

**Slots**

dp: Object of class "DisplayPars" ~~

**Methods**

**getCex** signature(obj = "gdObject"): ...  
**getColor** 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 gdObjects to be plotted.
minBase	minBase defines the minimum base that will be plotted, if omitted a minimum is determined from the objects in gdObjects if possible.
maxBase	maxBase defines the maximum base that will be plotted, if omitted 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"))
genomeAxis = new("GenomeAxis", add53 = TRUE, add35=TRUE)
gdPlot(list(ideog,expres,cop,genesplus,genomeAxis,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 `listFilters` 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 = "ENSG00000095203", 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

---

GeneModel-class      *Class "GeneModel", represents a custom gene model*

---

### 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

```
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	<i>Class "GeneRegion", representing gene structures in a defined genomic region</i>
------------------	---

---

### 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**

```

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	<i>Construct an AnnotationTrack object from biomaRt.</i>
-------------------	--

---

**Description**

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

**Usage**

```
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", ...)`.

### Slots

**intensity:** Object of class "matrix", matrix containing the intensities of expression or cgh data.  
Rows should be probes, columns samples  
**probeStart:** Object of class "numeric", start position of the probes  
**probeEnd:** Object of class "numeric", end position of the probes if available

### Methods

**show** signature(object = "GenericArray"): ...

### Author(s)

Steffen Durinck

### References

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

### See Also

objects to See Also as [gdPlot](#)

### Examples

```
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)
}
```

---

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", ...)`.

**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 color

**littleTicks:** Object of class "logical", indicating if the genome axis should be dense for improved 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	<i>Retrieves the genomic range of an object</i>
-----------------	---

---

**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	<i>Retrieves a display parameter from an object.</i>
--------	--

---

**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	<i>gets the size</i>
---------	----------------------

---

**Description**

Gets the size display parameter

**Usage**

```
getSize(obj, ...)
```

**Arguments**

obj	An object, usually a gdObject.
...	Ignored

**Examples**

```
#to be added
```

---

HighlightRegion-class *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**

```
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**

```
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")
```

---

intensity	<i>Contains dummy intensity data</i>
-----------	--------------------------------------

---

**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, ,
```

## 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

```
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	<i>Creates an object of class BaseTrack</i>
---------------	---

---

**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**

```
##---- 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

*Creates an object of class Gene*


---

**Description**

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

**Usage**

```
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

**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 (id, type, biomart, dp = NULL)
{
  if (missing(id))
    stop("Need to specify a gene identifier for creating a Gene")
  pt <- getClass("Gene")@prototype
  if (is.null(dp))
    dp <- pt@dp
  if (missing(type))
    type = pt@type
  new("Gene", id = id, type = type, biomart = biomart, dp = dp)
}
```

---

makeGeneModel

*Creates an object of class GeneModel*

---

**Description**

Creates an object of class GeneModel representing a custom annotation or gene model

**Usage**

```
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 parametes 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	<i>Creates an object of class Gene containing the intron-exon structures of genes</i>
----------------	---

---

**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 strcutures 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

**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**

intensity	Matrix of intensities, probes in the rows, samples in the columns
probeStart	Vector of start positions for the probes
probeEnd	Vector of end positions for probes (optional)
trackOverlay	Object of class TrackOverlay, needs to be added if overlays should be plotted as well
dp	Object of class DisplayPars which handles the display parameters for plotting

**Value**

Object of class GenericArray

**Author(s)**

Jim Bullard and Steffen Durinck

**References**

BMC bioinformatics 2009

**See Also**

gdPlot

**Examples**

```
showClass("GenericArray")
```



---

makeGenomeAxis	<i>Creates an object of class GenomeAxis</i>
----------------	--

---

**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	<i>Creates object of class Ideogram</i>
--------------	---

---

**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**

```
##---- 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	<i>Creates an object of class Legend</i>
------------	--

---

**Description**

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

**Usage**

```
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**

```
##---- 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

```
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

```
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	<i>Create objects of class TextOverlay</i>
-----------------	--

---

**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	<i>Creates an object of class Title</i>
-----------	---

---

**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**

```
##---- 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	<i>Creates an object of class Transcript</i>
----------------	--

---

**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 thebiomaRt 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**

```
##---- 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

**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	<i>Class "Overlay"</i>
---------------	------------------------

---

**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")
```

---

probstart	<i>Contains dummy expression array probe start positions</i>
-----------	--

---

**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	<i>Class "Segmentation" is used to specify segmentations to any class that extends Segmentable (GenericArray, BaseTrack)</i>
--------------------	--

---

**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),`

**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	<i>Contains dummy copy number segment data</i>
----------	--

---

**Description**

Contains dummy copy number segment data

**Examples**

```
#
```

---

segStart	<i>Contains dummy copy number segmentation start positions data</i>
----------	---

---

**Description**

Contains dummy copy number segmentation start positions

**Examples**

#

---

seqDataEx	<i>This is an example data set from chromosome 4 of yeast from various publicly available datasets.</i>
-----------	---

---

**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

Lior David et. al. A high-resolution map of transcription in the yeast genome. *Proc Natl Acad Sci U S A*, (2006)

William Lee A high-resolution atlas of nucleosome occupancy in yeast. *Nat Genet*, 2007

Adam Siepel, et. al. Evolutionarily conserved elements in vertebrate, insect, worm, and yeast genomes. *Genome Res*, 2005

**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"

**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	<i>Represent known transcript isoforms as annotated by Ensembl</i>
------------------	--

---

### 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

**drawGD** signature(.Object = "Transcript"): ...

**initialize** signature(.Object = "Transcript"): ...

**show** signature(object = "Transcript"): ...

### Author(s)

Steffen Durinck

### References

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

### See Also

objects to See Also as [gdPlot](#)

**Examples**

```
if(interactive()){
  data("unrData", package="GenomeGraphs")
  mart = useMart("ensembl", dataset="hsapiens_gene_ensembl")
  transcript = new("Transcript", id = "ENSG00000009307" , biomart = mart)
  gdPlot(list(transcript), minBase = min(exon@probeStart), maxBase=max(exon@probeEnd))
}
```

---

TranscriptRegion-class

*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 `new("TranscriptRegion", ...)`

**Slots**

**start:** Object of class "numeric", the start base of the genomic region

**end:** Object of class "numeric", the end base of the genomic region

**chromosome:** Object of class "character", the chromosome

**biomart:** Object of class "Mart", contains link to Ensembl and should be created using the `useMart` function of the `biomaRt` package

**ens:** Object of class "data.frame", users should not specify this, it contains the output of the query to Ensembl

**Methods**

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

**Author(s)**

Steffen Durinck

**References**

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

**See Also**

objects to See Also as [gdPlot](#)

**Examples**

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

---

unrData	<i>Contains exon array data</i>
---------	---------------------------------

---

**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**

```
#
```

---

unrNProbes	<i>Contains exon array data</i>
------------	---------------------------------

---

**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**

```
#
```

---

unrPositions	<i>Contains probe start and end positions of exon array probes</i>
--------------	--

---

**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**

```
#
```

---

yeastCons1	<i>Contains dummy yeast conservation data</i>
------------	---

---

**Description**

Contains dummy yeast base conservation data.

**Examples**

#

# Index

## \*Topic **classes**

- AnnotationTrack-class, 3
- BaseTrack-class, 4
- DisplayPars-class, 6
- drawTrackOverlay-methods, 8
- ExonArray-class, 8
- gdObject-class, 10
- Gene-class, 12
- GeneModel-class, 14
- GeneRegion-class, 15
- GenericArray-class, 17
- GenomeAxis-class, 18
- HighlightRegion-class, 20
- Ideogram-class, 21
- ImplementsTrackOverlay-class, 23
- Legend-class, 24
- Overlay-class, 42
- RectangleOverlay-class, 43
- Segmentation-class, 44
- Smoothing-class, 47
- TextOverlay-class, 47
- Title-class, 48
- TrackOverlay-class, 49
- Transcript-class, 50
- TranscriptRegion-class, 51

## \*Topic **datasets**

- cn, 5
- exonProbePos, 9
- ideogramTab, 22
- intensity, 23
- MappedRead-class, 41
- probstart, 42
- segEnd, 43
- segments, 44
- segStart, 45
- seqDataEx, 45
- unrData, 52
- unrNProbes, 52
- unrPositions, 52

- yeastCons1, 53

## \*Topic **hplot**

- DisplayPars, 5
- drawGD, 7
- gdPlot, 11
- geneBiomart, 13
- geneRegionBiomart, 16
- getPar, 19
- getSize, 20
- makeAnnotationTrack, 25
- makeBaseTrack, 26
- makeExonArray, 27
- makeGene, 28
- makeGeneModel, 29
- makeGeneRegion, 30
- makeGenericArray, 32
- makeGenomeAxis, 33
- makeIdeogram, 34
- makeLegend, 35
- makeRectangleOverlay, 36
- makeSegmentation, 37
- makeSmoothing, 37
- makeTextOverlay, 38
- makeTitle, 39
- makeTranscript, 40
- setPar, 46
- showDisplayOptions, 46

## \*Topic **methods**

- drawTrackOverlay-methods, 8
- getGenomicRange, 19

- AnnotationTrack-class, 3

- BaseTrack-class, 4

- cn, 5

- DisplayPars, 5, 26, 30, 33

- DisplayPars-class, 6

- drawGD, 7

- drawGD, AnnotationTrack-method  
(AnnotationTrack-class), 3
- drawGD, BaseTrack-method  
(BaseTrack-class), 4
- drawGD, ExonArray-method  
(ExonArray-class), 8
- drawGD, Gene-method (Gene-class), 12
- drawGD, GeneModel-method  
(GeneModel-class), 14
- drawGD, GeneRegion-method  
(GeneRegion-class), 15
- drawGD, GenericArray-method  
(GenericArray-class), 17
- drawGD, GenomeAxis-method  
(GenomeAxis-class), 18
- drawGD, Ideogram-method  
(Ideogram-class), 21
- drawGD, Legend-method (Legend-class), 24
- drawGD, MappedRead-method  
(MappedRead-class), 41
- drawGD, Segmentation-method  
(Segmentation-class), 44
- drawGD, Title-method (Title-class), 48
- drawGD, Transcript-method  
(Transcript-class), 50
- drawOverlay, TextOverlay-method  
(TextOverlay-class), 47
- drawOverlay, RectangleOverlay-method  
(RectangleOverlay-class), 43
- drawTrackOverlay, Segmentation-method  
(drawTrackOverlay-methods), 8
- drawTrackOverlay, Smoothing-method  
(drawTrackOverlay-methods), 8
- drawTrackOverlay-methods, 8
- ExonArray-class, 8
- exonProbePos, 9
- gdObject, 3, 4, 8, 21, 42–44, 47–49
- gdObject-class, 10
- gdPlot, 4, 9, 11, 13–15, 17, 18, 22, 24, 26, 28,  
29, 31, 33–35, 39, 41, 49–51
- Gene-class, 12
- geneBiomart, 13
- GeneModel-class, 14
- GeneRegion-class, 15
- geneRegionBiomart, 16
- GenericArray-class, 17
- GenomeAxis-class, 18
- getCex, gdObject-method  
(gdObject-class), 10
- getColor, gdObject-method  
(gdObject-class), 10
- getGenomicRange, 19
- getGenomicRange, BaseTrack-method  
(getGenomicRange), 19
- getGenomicRange, ExonArray-method  
(getGenomicRange), 19
- getGenomicRange, gdObject-method  
(getGenomicRange), 19
- getGenomicRange, Gene-method  
(getGenomicRange), 19
- getGenomicRange, GeneRegion-method  
(getGenomicRange), 19
- getGenomicRange, GenericArray-method  
(getGenomicRange), 19
- getGenomicRange, Transcript-method  
(getGenomicRange), 19
- getGenomicRange, TranscriptRegion-method  
(getGenomicRange), 19
- getLty, gdObject-method  
(gdObject-class), 10
- getLwd, gdObject-method  
(gdObject-class), 10
- getPar, 19
- getPar, DisplayPars-method  
(DisplayPars-class), 6
- getPar, gdObject-method  
(gdObject-class), 10
- getPch, gdObject-method  
(gdObject-class), 10
- getPlotId, AnnotationTrack-method  
(AnnotationTrack-class), 3
- getPointSize, gdObject-method  
(gdObject-class), 10
- getSegmentEnd, Segmentation-method  
(Segmentation-class), 44
- getSegments, Segmentation-method  
(Segmentation-class), 44
- getSegmentStart, Segmentation-method  
(Segmentation-class), 44
- getSize, 20
- getSize, gdObject-method  
(gdObject-class), 10
- HighlightRegion-class, 20
- Ideogram-class, 21

- ideogramTab, [22](#)
- ImplementsTrackOverlay-class, [23](#)
- initialize, AnnotationTrack-method  
(AnnotationTrack-class), [3](#)
- initialize, DisplayPars-method  
(DisplayPars-class), [6](#)
- initialize, gdObject-method  
(gdObject-class), [10](#)
- initialize, Gene-method (Gene-class), [12](#)
- initialize, GeneRegion-method  
(GeneRegion-class), [15](#)
- initialize, Transcript-method  
(Transcript-class), [50](#)
- intensity, [23](#)
- Legend-class, [24](#)
- makeAnnotationTrack, [25](#)
- makeBaseTrack, [26](#)
- makeExonArray, [27](#)
- makeGene, [28](#)
- makeGeneModel, [29](#)
- makeGeneRegion, [30](#)
- makeGenericArray, [32](#)
- makeGenomeAxis, [33](#)
- makeIdeogram, [34](#)
- makeLegend, [35](#)
- makeRectangleOverlay, [36](#), [43](#)
- makeSegmentation, [37](#)
- makeSmoothing, [37](#)
- makeTextOverlay, [38](#), [47](#)
- makeTitle, [39](#)
- makeTranscript, [40](#)
- MappedRead-class, [41](#)
- Overlay, [43](#), [48](#)
- Overlay-class, [42](#)
- probestart, [42](#)
- RectangleOverlay-class, [43](#)
- segEnd, [43](#)
- Segmentation-class, [44](#)
- segments, [44](#)
- segStart, [45](#)
- seqDataEx, [45](#)
- setPar, [46](#)
- setPar, DisplayPars-method  
(DisplayPars-class), [6](#)
- setPar, gdObject-method  
(gdObject-class), [10](#)
- show, BaseTrack-method  
(BaseTrack-class), [4](#)
- show, DisplayPars-method  
(DisplayPars-class), [6](#)
- show, ExonArray-method  
(ExonArray-class), [8](#)
- show, Gene-method (Gene-class), [12](#)
- show, GeneRegion-method  
(GeneRegion-class), [15](#)
- show, GenericArray-method  
(GenericArray-class), [17](#)
- show, MappedRead-method  
(MappedRead-class), [41](#)
- show, Transcript-method  
(Transcript-class), [50](#)
- show, TranscriptRegion-method  
(TranscriptRegion-class), [51](#)
- showDisplayOptions, [46](#)
- showDisplayOptions, character-method  
(gdObject-class), [10](#)
- showDisplayOptions, gdObject-method  
(gdObject-class), [10](#)
- Smoothing-class, [47](#)
- TextOverlay-class, [47](#)
- Title-class, [48](#)
- TrackOverlay, [47](#)
- TrackOverlay-class, [49](#)
- Transcript-class, [50](#)
- TranscriptRegion-class, [51](#)
- unrData, [52](#)
- unrNProbes, [52](#)
- unrPositions, [52](#)
- yeastCons1, [53](#)