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# Plotting using Genominator and GenomeGraphs (Beta)

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This vignette is preliminary, and should be viewed as subject to change. A number of the functions are not directly exported by the package – there is a reason for that.

In this vignette we demonstrate how to visualize data using the *GenomeGraphs* package. The main idea is that we want to build a plotting function which we can use to plot regions. The simplest case is the following:

First, we make a database:

```
> require(Genominator)
> options(verbose = FALSE)
> N <- 100000 # the number of observations.
> K <- 100    # the number of annotation regions, not less than 10
> df <- data.frame(chr = sample(1:16, size = N, replace = TRUE),
+                 location = sample(1:1000, size = N, replace = TRUE),
+                 strand = sample(c(1L,-1L), size = N, replace = TRUE))
> eData <- aggregateExpData(importToExpData(df, dbFilename = "pmy.db", overwrite = TRUE, tablename = "e"))
> annoData <- data.frame(chr = sample(1:16, size = K, replace = TRUE),
+                       strand = sample(c(1, -1), size = K, replace = TRUE),
+                       start = (st <- sample(1:1000, size = K, replace = TRUE)),
+                       end = st + rpois(K, 75),
+                       feature = c("gene", "intergenic")[sample(1:2, size = K, replace = TRUE)])
> rownames(annoData) <- paste("elt", 1:K, sep = ".")

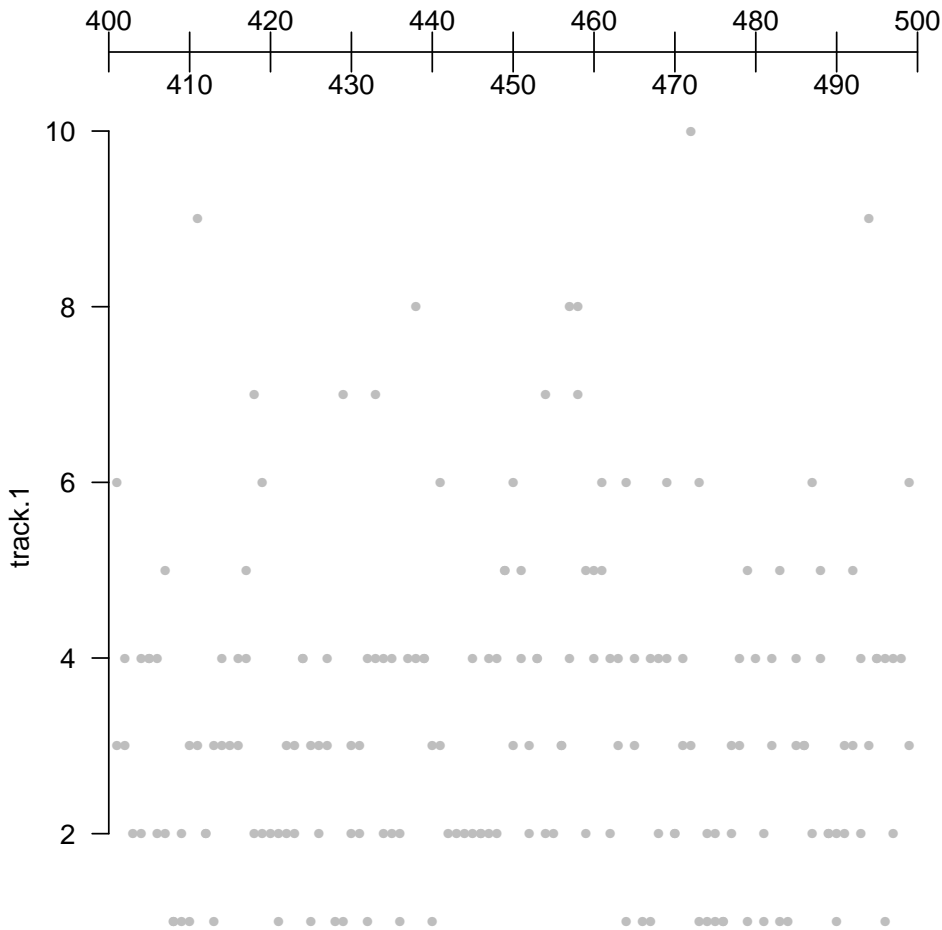
> rp <- Genominator:::makeRegionPlotter(list("track.1" = list(expData = eData, what = "counts")))
> args(rp)

function (chr, start, end, overlays = NULL, title = NULL, ...)
NULL
```

This constructs a function which can be called to view particular pieces of data.

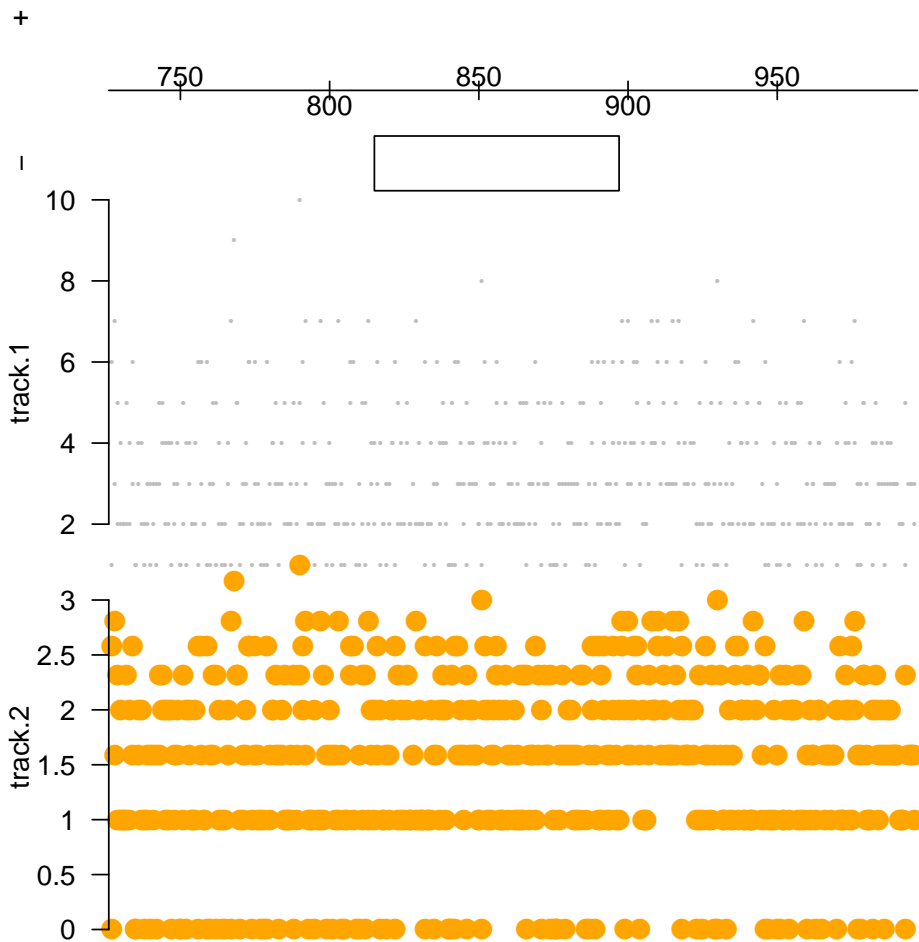
```
> rp(1, 10, 1000)
```





Here we can plot our annotation using the annotation factory construct. This is probably a little advanced. An easier thing is to use Ensembl to do the plotting of the annotation. Often, however, you will want to augment the annotation produced by Ensembl.

```
> annoFactory <- Genominator::makeAnnoFactory(annoData, featureColumnName = "feature",
+                                           groupColumnName = NULL, idColumnName = NULL,
+                                           dp = DisplayPars("gene" = "blue",
+                                           "intergenic" = "green"))
> rp <- Genominator::makeRegionPlotter(list("track.1" = list(expData = eData, what = "counts",
+                                           dp = DisplayPars(lwd=.2, color = "grey")),
+                                           "track.2" = list(expData = eData, what = "counts",
+                                           fx = log2, DisplayPars(lwd=.3, color = "black"))),
+                                       annoFactory = annoFactory)
> rp(annoData[1,"chr"], annoData[1, "start"] - 100, annoData[1, "end"] + 100)
```



*GenomeGraphs* also offers a nice way to plot annotation for a given region using data from Ensembl or other sources of annotation - in some cases you have to do a little work because of the way that Biomart indexes the annotation and the way the *Genominator* package works (in this case yeast annotation is stored with Roman numerals denoting the chromosomes).

```
> require("biomaRt")
> mart <- useMart("ensembl", dataset = "scerevisiae_gene_ensembl")
> annoFactory <- Genominator::makeAnnoFactory(mart, chrFunction = function(chr) as.roman(chr))
> load(system.file("data", "chr1_yeast.rda", package = "Genominator"))
> head(chr1_yeast)

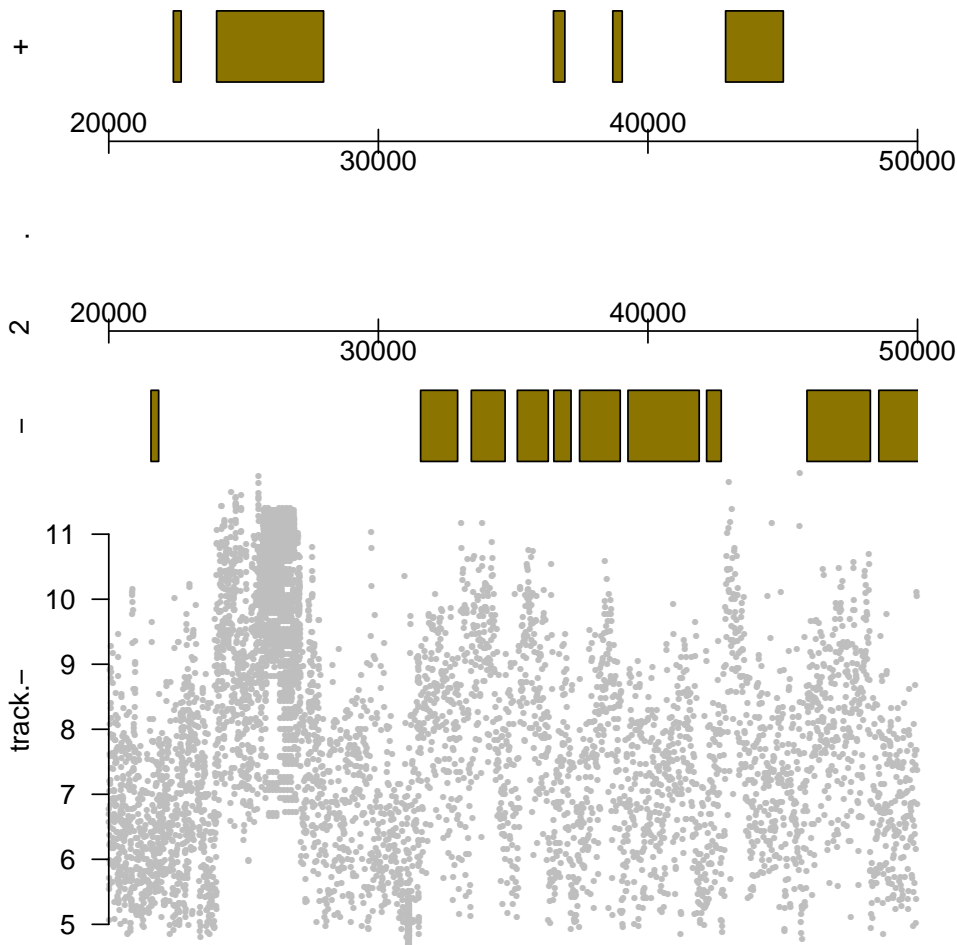
  chr location strand  mRNA_1  mRNA_2
1   1         1     -1 9.038919 8.614710
2   1         1     -1 9.172428 8.558421
3   1         2     -1 9.422065 9.131857
4   1         2     -1 8.679480 8.442943
5   1         2     -1 8.546894 8.794416
6   1         2     -1 8.784635 8.918863

> yData <- importToExpData(chr1_yeast, dbFilename = "my.db", tablename = "yeast",
+                               overwrite = TRUE)
> rp <- Genominator::makeRegionPlotter(list("track.-" = list(expData = yData, what = c("mRNA_1", "mRNA_2"),
+                               fx = rowMeans, strand = -1,
```

```

+                                     dp = DisplayPars(lwd=.3, color = "grey")),
+                                     annoFactory = annoFactory)
> rp(1, 20000, 50000)

```



## SessionInfo

- R version 3.5.0 (2018-04-23), x86\_64-pc-linux-gnu
- Locale: LC\_CTYPE=en\_US.UTF-8, LC\_NUMERIC=C, LC\_TIME=en\_US.UTF-8, LC\_COLLATE=C, LC\_MONETARY=en\_US.UTF-8, LC\_MESSAGES=en\_US.UTF-8, LC\_PAPER=en\_US.UTF-8, LC\_NAME=C, LC\_ADDRESS=C, LC\_TELEPHONE=C, LC\_MEASUREMENT=en\_US.UTF-8, LC\_IDENTIFICATION=C
- Running under: Ubuntu 16.04.4 LTS
- Matrix products: default
- BLAS: /home/biocbuild/bbs-3.7-bioc/R/lib/libRblas.so
- LAPACK: /home/biocbuild/bbs-3.7-bioc/R/lib/libRlapack.so
- Base packages: base, datasets, grDevices, graphics, grid, methods, parallel, stats, stats4, utils
- Other packages: BiocGenerics 0.26.0, DBI 0.8, GenomeGraphs 1.40.0, Genominator 1.34.0, IRanges 2.14.0, RSQLite 2.1.0, S4Vectors 0.18.0, biomaRt 2.36.0

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- Loaded via a namespace (and not attached): AnnotationDbi 1.42.0, Biobase 2.40.0, R6 2.2.2, RCurl 1.95-4.10, Repp 0.12.16, XML 3.98-1.11, assertthat 0.2.0, bit 1.1-12, bit64 0.9-7, bitops 1.0-6, blob 1.1.1, compiler 3.5.0, curl 3.2, digest 0.6.15, httr 1.3.1, magrittr 1.5, memoise 1.1.0, pkgconfig 2.0.1, prettyunits 1.0.2, progress 1.1.2, stringi 1.1.7, stringr 1.3.0, tools 3.5.0