Package ‘tracktables’

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Type Package

Title Build IGV tracks and HTML reports

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Description Methods to create complex IGV genome browser sessions and dynamic IGV reports in HTML pages.

biocViews Sequencing, ReportWriting

VignetteBuilder knitr

License GPL (>= 3)

LazyLoad yes

Depends R (>= 3.0.0)

Imports IRanges, GenomicRanges, XVector, Rsamtools, XML, tractor.base, stringr, RColorBrewer, methods

Suggests knitr, BiocStyle

Collate ‘tracktablesFunctions.R’

NeedsCompilation no

R topics documented:

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## igvParam

Parameters for displaying bigwigs, bams and intervals in IGV

### Description

Use `igvParam( object)` to create a parameter object to control IGV display invoked from make-tracktable() report or from makeIGVSession() XML files. Parameters for bigwig, bam and intervals files may be provided. See IGV manual for a full description of options.

### Usage

```r
igvParam(bigwig.altColor = "darkgrey", bigwig.color = "darkgrey",
          bigwig.autoScale = "true", bigwig.displayMode = "COLLAPSED",
          bigwig.featureVisibilityWindow = -1, bigwig.fontSize = 10,
          bigwig.normalize = "false", bigwig.renderer = "BAR_CHART",
          bigwig.sortable = "true", bigwig.visible = "true",
          bigwig.windowFunction = "mean", bigwig.baseline = 0,
          bigwig.drawBaseline = "true", bigwig.flipAxis = "false",
          bigwig.maximum = 50, bigwig.minimum = 0, bigwig.type = "LINEAR",
          interval.altColor = "darkgrey", interval.color = "darkgrey",
          interval.autoScale = "true", interval.displayMode = "character",
          interval.featureVisibilityWindow = -1, interval.fontSize = 10,
          interval.height = 40, interval.normalize = "false",
          interval.renderer = "BASIC_FEATURE", interval.sortable = "true",
          interval.visible = "true", interval.windowFunction = "count",
          bam.altColor = "darkgrey", bam.color = "darkgrey",
          bam.autoScale = "true", bam.displayMode = "EXPANDED",
          bam.featureVisibilityWindow = -1, bam.fontSize = 10,
          bam.showSpliceJunctions = "false", bam.colorByTag = "",
          bam.colorOption = "UNEXPECTED_PAIR", bam.flagUnmappedPairs = "false",
          bam.groupByTag = "", bam.maxInsertSize = 1000, bam.minInsertSize = 50,
          bam.shadeBasesOption = "QUALITY", bam.shadeCenters = "true",
          bam.showAllBases = "false", bam.sortByTag = "")
```

```r
igvParam(bigwig.altColor = "darkgrey", bigwig.color = "darkgrey",
          bigwig.autoScale = "true", bigwig.displayMode = "COLLAPSED",
          bigwig.featureVisibilityWindow = -1, bigwig.fontSize = 10,
          bigwig.normalize = "false", bigwig.renderer = "BAR_CHART",
          bigwig.sortable = "true", bigwig.visible = "true",
          bigwig.windowFunction = "mean", bigwig.baseline = 0,
          bigwig.drawBaseline = "true", bigwig.flipAxis = "false",
          bigwig.maximum = 50, bigwig.minimum = 0, bigwig.type = "LINEAR",
          interval.altColor = "darkgrey", interval.color = "darkgrey",
          interval.autoScale = "true", interval.displayMode = "character",
          interval.featureVisibilityWindow = -1, interval.fontSize = 10,
          interval.height = 40, interval.normalize = "false",
          interval.renderer = "BASIC_FEATURE", interval.sortable = "true",
          interval.visible = "true", interval.windowFunction = "count",
          bam.altColor = "darkgrey", bam.color = "darkgrey",
          bam.autoScale = "true", bam.displayMode = "EXPANDED",
          bam.featureVisibilityWindow = -1, bam.fontSize = 10,
          bam.showSpliceJunctions = "false", bam.colorByTag = "",
          bam.colorOption = "UNEXPECTED_PAIR", bam.flagUnmappedPairs = "false",
          bam.groupByTag = "", bam.maxInsertSize = 1000, bam.minInsertSize = 50,
          bam.shadeBasesOption = "QUALITY", bam.shadeCenters = "true",
          bam.showAllBases = "false", bam.sortByTag = "")
```
\texttt{igvParam}

\verbatim
bam.showSpliceJunctions = "false", bam.colorByTag = "",
bam.colorOption = "UNEXPECTED_PAIR", bam.flagUnmappedPairs = "false",
bam.groupByTag = "", bam.maxInsertSize = 1000, bam.minInsertSize = 50,
bam.shadeBasesOption = "QUALITY", bam.shadeCenters = "true",
bam.showAllBases = "false", bam.sortByTag = "")

Arguments

\texttt{bigwig.altColor}
A character vector of alternate colour for bigwigs displayed in IGV.

\texttt{bigwig.color}
A character vector of main colour for bigwigs displayed in IGV.

\texttt{bigwig.autoScale}
A character vector ("true"/"false") to indicate whether data is autoscaled for bigwigs displayed in IGV (Default "true").

\texttt{bigwig.displayMode}
A character vector of display mode for bigwigs displayed in IGV.

\texttt{bigwig.featureVisibilityWindow}
A numeric vector of feature visibility window for bigwigs displayed in IGV (Default -1).

\texttt{bigwig.fontSize}
A numeric vector of font size for bigwigs displayed in IGV.

\texttt{bigwig.normalize}
A character vector ("true"/"false") to indicate whether data is normalised for bigwigs displayed in IGV (Default "false").

\texttt{bigwig.renderer}
A character vector of renderer for bigwigs displayed in IGV (Default "BAR_CHART").

\texttt{bigwig.sortable}
A character vector ("true"/"false") to indicate whether data is sortable for bigwigs displayed in IGV (Default "true").

\texttt{bigwig.visible}
A character vector ("true"/"false") to indicate whether data is visible for bigwigs displayed in IGV (Default "true").

\texttt{bigwig.windowFunction}
A character vector ("true"/"false") of window function for bigwigs displayed in IGV (Default "mean").

\texttt{bigwig.baseline}
A numeric vector of baseline bigwigs displayed in IGV.

\texttt{bigwig.drawBaseline}
A character vector ("true"/"false") of whether to draw baseline for bigwigs displayed in IGV (Default "true").

\texttt{bigwig.flipAxis}
A character vector ("true"/"false") to indicate whether to flip axis for bigwigs displayed in IGV (Default "false").

\texttt{bigwig.maximum}
A numeric vector of maximum value to display for bigwigs displayed in IGV (Default 50).

\texttt{bigwig.minimum}
A numeric vector of minimum value to display for bigwigs displayed in IGV (Default 0).

\texttt{bigwig.type}
A character vector of display type for bigwigs displayed in IGV (Default "LINEAR").
interval.altColor
   A character vector of alternate colour for intervals displayed in IGV.

interval.color
   A character vector of main colour for intervals displayed in IGV.

interval.autoScale
   A character vector ("true"/"false") to indicate whether data is autoscaled for intervals displayed in IGV (Default "false").

interval.displayMode
   A character vector of display mode for intervals displayed in IGV (Default "COLLAPSED").

interval.featureVisibilityWindow
   A numeric vector of feature visibility window for intervals displayed in IGV (Default -1).

interval.fontSize
   A numeric vector of font size for intervals displayed in IGV.

interval.height
   A numeric vector of height for intervals displayed in IGV.

interval.normalize
   A character vector ("true"/"false") to indicate whether data is normalised for intervals displayed in IGV (Default "false").

interval.renderer
   A character vector of renderer for intervals displayed in IGV (Default "BASIC_FEATURE").

interval.sortable
   A character vector ("true"/"false") to indicate whether data is sortable for intervals displayed in IGV (Default "true").

interval.visible
   A character vector ("true"/"false") to indicate whether data is visible for intervals displayed in IGV (Default "true").

interval.windowFunction
   A character vector ("true"/"false") of window function for intervals displayed in IGV (Default "count").

bam.altColor
   A character vector of alternate colour for bam files displayed in IGV.

bam.color
   A character vector of main colour for bam files displayed in IGV.

bam.autoScale
   A character vector ("true"/"false") to indicate whether data is autoscaled for bam files displayed in IGV (Default "false").

bam.displayMode
   A character vector of display mode for bam files displayed in IGV (Default "EXPANDED").

bam.featureVisibilityWindow
   A numeric vector of feature visibility window for bam files displayed in IGV (Default -1).

bam.fontSize
   A numeric vector of font size for intervals displayed in IGV.

bam.showSpliceJunctions
   A character vector ("true"/"false") to indicate whether to show splice junctions for bam files displayed in IGV (Default "false").

bam.colorByTag
   A character vector to indicate whether to colour reads by Tags for Bam files (Default = "").
### igvParam

bam.colorOption
A character vector of option to highlight Tags for Bam files (Default = "UNEXPECTED_PAIR").

bam.flagUnmappedPairs
A character vector ("true"/"false") to indicate whether to flag unmapped pairs for bam files displayed in IGV (Default "false").

bam.groupByTag
A character vector ("true"/"false") to indicate how to groups reads by Tag for bam files displayed in IGV (Default ").

bam.maxInsertSize
A numeric vector of maximum insert size to display for Bam files.

bam.minInsertSize
A numeric vector of minimum insert size to display for Bam files.

bam.shadeBasesOption
A character vector of option to shade bases for Bam files (Default "QUALITY").

bam.shadeCenters
A character vector ("true"/"false") to indicate whether to shade centres for bam files displayed in IGV (Default "false").

bam.showAllBases
A character vector ("true"/"false") to indicate to show all bases for bam files displayed in IGV (Default "false").

bam.sortByTag
A character vector ("true"/"false") to indicate how to sort reads by Tag for bam files displayed in IGV (Default "").

### Value

An igvParam class object to use with maketracktable,MakeIGVSession and makeIGVSessionMXL

### Author(s)

Thomas Carroll

### Examples

```r
# Simple initialisation of an IGVParam object
ingvDisplayParams <- igvParam()

# More custom initialisation of an IGVParam object .
ingvDisplayParams <- igvParam(bigwig.color="red",bigwig.autoScale = "false",
bigwig.minimum = 10, bigwig.maximum = 100)

# See full parameters and IGV online manual for more details on customistions

# Use igvParams with maketracktables function to customise bigwig display colour and data range.
fileLocations <- system.file("extdata",package="tracktables")
bigwigs <- dir(fileLocations,pattern="*.bw",full.names=TRUE)
intervals <- dir(fileLocations,pattern="*.bed",full.names=TRUE)
bigWigMat <- cbind(gsub("_Example.bw","",basename(bigwigs)),
```

```r
```
```r
intervalsMat <- cbind(gsub("_Peaks.bed","",basename(intervals)),
                      intervals)

fileSheet <- merge(bigWigMat,intervalsMat,all=TRUE)

fileSheet <- as.matrix(cbind(fileSheet,NA))

colnames(fileSheet) <- c("SampleName","bigwig","interval","bam")

SampleSheet <- cbind(as.vector(fileSheet[,"SampleName"]),
                       c("EBF","H3K4me3","H3K9ac","RNAPo2"),
                       c("ProB","ProB","ProB","ProB"))

colnames(SampleSheet) <- c("SampleName","Antibody","Species")

MakeIGVSession(SampleSheet,fileSheet,
               igvdirectory=getwd(),"Example","mm9",
               igvParams=igvDisplayParams)
```

### Intervals

<table>
<thead>
<tr>
<th>Intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example genomic intervals</td>
</tr>
</tbody>
</table>

### Description

This dataset contains peaks from an in-house EBF1 ChIP-seq.

### Usage

```r
data(Intervals)
```

### Details

- Intervals GRanges object containing EBF1 peaks

### Value

A GRanges object with two rows

---

### makebedtable

Make HTML pages for interval files or GRanges.

### Description

Creates HTML pages for interval files or GRanges (Tracktables Interval Report).

### Usage

```r
makebedtable(grangesObject, name, basedirectory)
```
MakeIGVSampleMetadata

Make sample metadata file for use with IGV.

Description

Creates sample metadata file for IGV from a Samplesheet of metadata and FileSheet of file locations.

Usage

MakeIGVSampleMetadata(SampleSheet, fileSheet, igvdirectory)

Arguments

SampleSheet A data.frame object with metadata information for samples. First column must contain unique sample ids.
fileSheet A data.frame of file locations. First column must contain the unique sample ids.
igvdirectory A character of the directory to which sample metadata file is written.

Value

A character of file location for the IGV sample information file.

Author(s)

Thomas Carroll
MakeIGVSession

Make IGV session XML and sample information file

Description

#' Creates IGV session XML and sample information file from a SampleSheet of metadata and FileSheet of file locations.

Usage

MakeIGVSession(SampleSheet, fileSheet, igvdirectory, XMLname, genomeName, locusName = "All", colourBy = NULL, igvParams = igvParam(), writedirectory = NULL, full.xml.paths = FALSE, full.file.paths = FALSE, use.path.asis = FALSE)

Arguments

SampleSheet A data.frame object with metadata information for samples. First column must contain unique sample ids.

fileSheet A data.frame of file locations. First column must contain the unique sample ids.

igvdirectory A character of the directory to which sample metadata file is written.

XMLname A character of the name for IGV session xml

genomeName A character of genome for IGV (See IGV user guide for details)

locusName A character of locus to display in igv on loading (See IGV user guide for details)

colourBy Character defining which sample metadata to be used for colouring bigwig files
MakeIGVSession

igvParams An object of class igvParam containing display parameters for IGV. When providing a list, this list must be same length as number of samples and each element have two numeric values corresponding to minimum and maximum value to be used in setting data range. Currently only "autoscale" or a list of minimum and maximum values are accepted.

writedirectory A character of the directory to which files will be written. Default is set to igvdirectory argument.

full.xml.paths Boolean of whether reference to XML and sample information files should be by relative or absolute paths. Default is FALSE

full.file.paths Boolean of whether reference to sample bigWig/Bam/interval files should be by relative or absolute paths. Default is FALSE

use.path.asis Boolean of whether paths to files in samplesheet should be used as is. If TRUE overrides sample files paths specified by full.file.paths argument. Default is FALSE

Value

A character of file location for the IGV session XML

Author(s)

Thomas Carroll

Examples

fileLocations <- system.file("extdata",package="tracktables")
bigwigs <- dir(fileLocations,pattern="*.bw",full.names=TRUE)
intervals <- dir(fileLocations,pattern="*.bed",full.names=TRUE)
bigWigMat <- cbind(gsub("_Example.bw"","",basename(bigwigs)),
                   bigwigs)
intervalsMat <- cbind(gsub("_Peaks.bed"","",basename(intervals)),
                     intervals)
fileSheet <- merge(bigWigMat,intervalsMat,all=TRUE)
fileSheet <- as.matrix(cbind(fileSheet,NA))
colnames(fileSheet) <- c("SampleName","bigwig","interval","bam")
SampleSheet <- cbind(as.vector(fileSheet[,"SampleName"]),
                      c("EBF","H3K4me3","H3K9ac","RNAPol2"),
                      c("ProB","ProB","ProB","ProB"))
colnames(SampleSheet) <- c("SampleName","Antibody","Species")
MakeIGVSession(SampleSheet,fileSheet,igvdirectory=getwd(),"Example","mm9")
MakeIGVSessionXML  
*Make IGV session XML*

**Description**

Creates session XML for IGV from a FileSheet of file locations.

**Usage**

```r
MakeIGVSessionXML(fileSheet, igvdirectory, XMLname, genomeName, 
locusName = "All", colourBy = NULL, igvParams = igvParam(), 
writedirectory = NULL, full.xml.paths = FALSE, full.file.paths = FALSE, 
use.path.asis = FALSE)
```

**Arguments**

- `fileSheet` A data.frame of file locations. First column must contain the unique sample ids.
- `igvdirectory` A character of the directory to which IGV XML session is written.
- `XMLname` A character of the name for IGV session xml
- `genomeName` A character of genome for IGV (See IGV user guide for details)
- `locusName` A character of locus to display in igv on loading (See IGV user guide for details)
- `colourBy` Character vector of RGB colours to use for colouring displayed BigWigs
- `igvParams` An object of class igvParam containing display parameters for IGV. When providing a list, this list must be same length as number of samples and each element have two numeric values corresponding to minimum and maximum value to be used in setting data range. Currently only "autoscale" or a list of minimum and maximum values are accepted.
- `writedirectory` A character of the directory to which files will be written. Default is set to igvdirectory argument.
- `full.xml.paths` Boolean of whether reference to XML and sample information files should be by relative or absolute paths. Default is FALSE
- `full.file.paths` Boolean of whether reference to sample bigWig/Bam/interval files should be by relative or absolute paths. Default is FALSE
- `use.path.asis` Boolean of whether paths to files in samplesheet should be used as is. If TRUE overrides sample files paths specified by full.file.paths argument. Default is FALSE

**Value**

A character of file location for the IGV session XML

**Author(s)**

Thomas Carroll
Examples

fileLocations <- system.file("extdata", package="tracktables")
bigwigs <- dir(fileLocations, pattern="*.bw", full.names=TRUE)
intervals <- dir(fileLocations, pattern="*.bed", full.names=TRUE)
bigWigMat <- cbind(gsub("_Example.bw","", basename(bigwigs)),
   bigwigs)
intervalsMat <- cbind(gsub("_Peaks.bed","", basename(intervals)),
   intervals)
fileSheet <- merge(bigWigMat, intervalsMat, all=TRUE)
fileSheet <- as.matrix(cbind(fileSheet, NA))
colnames(fileSheet) <- c("SampleName", "bigwig", "interval", "bam")
MakeIGVSessionXML(fileSheet, igvdirectory=getwd(), "Example", "mm9")

maketracktable
Make HTML pages for IGV sessions (Tracktables Experiment Report)

Description

Creates HTML table of sample metadata and all required files for interacting with IGV.

Usage

maketracktable(fileSheet, SampleSheet, filename, basedirectory, genome,
   colourBy = NULL, igvParams = igvParam(), writedirectory = NULL,
   full.xml.paths = FALSE, full.file.paths = FALSE, use.path.asis = FALSE)

Arguments

fileSheet A data frame containing sample file locations (e.g. BigWig locations).
SampleSheet A data frame containing sample metadata
filename Character of name for tracktables HTML report. (.html prefix is added automatically)
basedirectory Character of directory for tracktables HTML report, IGV sessions and any interval files
genome Character of genome for IGV (See IGV user guide for details)
colourBy Character defining which sample metadata to be used for colouring bigwig files
igvParams An object of class igvParam containing display parameters for IGV. When providing a list, this list must be same length as number of samples and each element have two numeric values corresponding to minimum and maximum value to be used in setting data range. Currently only "autoscale" or a list of minimum and maximum values are accepted.
maketracktable

writedirectory  A character of the directory to which files will be written. Default is set to igvdirectory argument.

full.xml.paths  Boolean of whether reference to XML and sample information files should be by relative or absolute paths. Default is FALSE

full.file.paths  Boolean of whether reference to sample bigWig/Bam/interval files should be by relative or absolute paths. Default is FALSE

use.path.asis  Boolean of whether paths to files in samplesheet should be used as is. If TRUE overrides sample files paths specified by full.file.paths argument. Default is FALSE

Value

Author(s)
Thomas Carroll

Examples
fileLocations <- system.file("extdata",package="tracktables")
bigwigs <- dir(fileLocations,pattern="*.bw",full.names=TRUE)
intervals <- dir(fileLocations,pattern="*.bed",full.names=TRUE)
bigWigMat <- cbind(gsub("_Example.bw","",basename(bigwigs)),
    bigwigs)
intervalsMat <- cbind(gsub("_Peaks.bed","",basename(intervals)),
    intervals)
fileSheet <- merge(bigWigMat,intervalsMat,all=TRUE)
fileSheet <- as.matrix(cbind(fileSheet,NA))
colnames(fileSheet) <- c("SampleName","bigwig","interval","bam")
SampleSheet <- cbind(as.vector(fileSheet[,"SampleName"]),
    c("EBF","H3K4me3","H3K9ac","RNAPol2"),
    c("ProB","ProB","ProB","ProB"))

colnames(SampleSheet) <- c("SampleName","Antibody","Species")
HTMLreport <- maketracktable(fileSheet,SampleSheet,
    "IGV_Example.html",
    basedirectory=getwd(),
    "mm9")
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