

Package ‘ggmsa’

May 14, 2025

Title Plot Multiple Sequence Alignment using 'ggplot2'

Version 1.14.0

Description A visual exploration tool for multiple sequence alignment and associated data. Supports MSA of DNA, RNA, and protein sequences using 'ggplot2'. Multiple sequence alignment can easily be combined with other 'ggplot2' plots, such as phylogenetic tree Visualized by 'ggtree', boxplot, genome map and so on. More features: visualization of sequence logos, sequence bundles, RNA secondary structures and detection of sequence recombinations.

Depends R (>= 4.1.0)

Imports Biostrings, ggplot2, magrittr, tidyr, utils, stats, aplot, RColorBrewer, ggalt, ggforce, dplyr, R4RNA, grDevices, seqmagick, grid, methods, statebins, ggtree (>= 1.17.1)

Suggests ggtreeExtra, ape, cowplot, knitr, BiocStyle, rmarkdown, readxl, ggnewscale, kableExtra, gggenes, testthat (>= 3.0.0)

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URL [https://doi.org/10.1093/bib/bbac222\(paper\)](https://doi.org/10.1093/bib/bbac222(paper)),
<https://www.amazon.com/Integration-Manipulation-Visualization-Phylogenetic-Computational-ebook/dp/B0B5NLZR1Z/>
(book)

BugReports <https://github.com/YuLab-SMU/ggmsa/issues>

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| | |
|--------------------|--------------------|
| <i>adjust_ally</i> | <i>adjust_ally</i> |
|--------------------|--------------------|

Description

adjust the tree branch position after assigning ancestor node

Usage

```
adjust_ally(tree, node, sub = FALSE, seq_colname = "mol_seq")
```

Arguments

| | |
|--------------------|----------------------------------|
| <i>tree</i> | ggtree object |
| <i>node</i> | internal node in tree |
| <i>sub</i> | logical value. |
| <i>seq_colname</i> | the colname of MSA on tree\$data |

Value

tree

Author(s)

Lang Zhou

| | |
|------------|-------------------|
| assign_dms | <i>assign_dms</i> |
|------------|-------------------|

Description

assign dms value to alignments.

Usage

```
assign_dms(x, dms)
```

Arguments

| | |
|-----|----------------------------|
| x | data frame from tidy_msa() |
| dms | dms data frame |

Value

tree

Author(s)

Lang Zhou

| | |
|------------------|---|
| available_colors | <i>List Color Schemes currently available</i> |
|------------------|---|

Description

This function lists color schemes currently available that can be used by 'ggmsa'

Usage

```
available_colors()
```

Value

A character vector of available color schemes

Author(s)

Lang Zhou

Examples

```
available_colors()
```

| | |
|-----------------|---|
| available_fonts | <i>List Font Families currently available</i> |
|-----------------|---|

Description

This function lists font families currently available that can be used by 'ggmsa'

Usage

```
available_fonts()
```

Value

A character vector of available font family names

Author(s)

Lang Zhou

Examples

```
available_fonts()
```

| | |
|---------------|---|
| available_msa | <i>List MSA objects currently available</i> |
|---------------|---|

Description

This function lists MSA objects currently available that can be used by 'ggmsa'

Usage

```
available_msa()
```

Value

A character vector of available objects

Author(s)

Lang Zhou

Examples

```
available_msa()
```

extract_seq

extract_seq

Description

extract ancestor sequence from tree data

Usage

```
extract_seq(tree_adjust, seq_colname = "mol_seq")
```

Arguments

tree_adjust ggtree object
seq_colname the colname of MSA on tree\$data

Value

character

Author(s)

Lang Zhou

facet_msa

segment MSA

Description

The MSA would be plot in a field that you set.

Usage

```
facet_msa(field)
```

Arguments

field a numeric vector of the field size.

Value

ggplot layers

Author(s)

Lang Zhou

Examples

```
library(ggplot2)
f <- system.file("extdata/sample.fasta", package="ggmsa")
# 2 fields
ggmsa(f, end = 120, font = NULL, color="Chemistry_AA") +
  facet_msa(field = 60)
# 3 fields
ggmsa(f, end = 120, font = NULL, color="Chemistry_AA") +
  facet_msa(field = 40)
```

geom_GC

geom_GC

Description

Multiple sequence alignment layer for ggplot2. It plot points of GC content.

Usage

```
geom_GC(show.legend = FALSE)
```

Arguments

`show.legend` logical. Should this layer be included in the legends?

Value

a ggplot layer

Author(s)

Lang Zhou

Examples

```
#plot GC content
f <- system.file("extdata/LeaderRepeat_All.fa", package="ggmsa")
ggmsa(f, font = NULL, color="Chemistry_NT") + geom_GC()
```

geom_helix

geom_helix

Description

The layer of helix plot

Usage

```
geom_helix(helix_data, color_by = "length", overlap = FALSE, ...)
```

Arguments

| | |
|------------|--|
| helix_data | a data frame. The file of nucleotide secondary structure and then read by readSSfile(). |
| color_by | generate colors for helices by various rules, including integer counts and value ranges one of "length" and "value" |
| overlap | Logicals. If TRUE, two structures data called predict and known must be given(eg:helix_data = list(known = data1, predicted = data2)), plots the predicted helices that are known on top, predicted helices that are not known on the bottom, and finally plots unpredicted helices on top in black. |
| ... | additional parameter |

Value

ggplot2 layers

Author(s)

Lang Zhou

Examples

```
RF03120 <- system.file("extdata/Rfam/RF03120_SS.txt", package="ggmsa")
RF03120_fas <- system.file("extdata/Rfam/RF03120.fasta", package="ggmsa")
SS <- readSSfile(RF03120, type = "Vienna")
ggmsa(RF03120_fas, font = NULL, border = NA,
      color = "Chemistry_NT", seq_name = FALSE) +
geom_helix(SS)
```

| | |
|----------|-----------------|
| geom_msa | <i>geom_msa</i> |
|----------|-----------------|

Description

Multiple sequence alignment layer for ggplot2. It creates background tiles with/without sequence characters.

Usage

```
geom_msa(
  data,
  font = "helvetica",
  mapping = NULL,
  color = "Chemistry_AA",
  custom_color = NULL,
  char_width = 0.9,
  none_bg = FALSE,
  by_conservation = FALSE,
  position_highlight = NULL,
  seq_name = NULL,
  border = NULL,
  consensus_views = FALSE,
  use_dot = FALSE,
  disagreement = TRUE,
  ignore_gaps = FALSE,
  ref = NULL,
  position = "identity",
  show.legend = FALSE,
  dms = FALSE,
  position_color = FALSE,
  ...
)
```

Arguments

| | |
|--------------|--|
| data | sequence alignment with data frame, generated by tidy_msa(). |
| font | font families, possible values are 'helvetica', 'mono', and 'DroidSansMono', 'TimesNewRoman'. Defaults is 'helvetica'. |
| mapping | aes mapping. If font = NULL, only plot the background tile. |
| color | A Color scheme. One of 'Clustal', 'Chemistry_AA', 'Shapely_AA', 'Zappo_AA', 'Taylor_AA', 'LETTER', 'CN6', 'Chemistry_NT', 'Shapely_NT', 'Zappo_NT', 'Taylor_NT'. Defaults is 'Chemistry_AA'. |
| custom_color | A data frame with two columns called "names" and "color". Customize the color scheme. |

| | |
|--------------------|---|
| char_width | a numeric vector. Specifying the character width in the range of 0 to 1. Defaults is 0.9. |
| none_bg | a logical value indicating whether background should be displayed. Defaults is FALSE. |
| by_conservation | a logical value. The most conserved regions have the brightest colors. |
| position_highlight | A numeric vector of the position that need to be highlighted. |
| seq_name | a logical value indicating whether sequence names should be displayed. Defaults is 'NULL' which indicates that the sequence name is displayed when 'font = null', but 'font = char' will not be displayed. If 'seq_name = TRUE' the sequence name will be displayed in any case. If 'seq_name = FALSE' the sequence name will not be displayed under any circumstances. |
| border | a character string. The border color. |
| consensus_views | a logical value that opening consensus views. |
| use_dot | a logical value. Displays characters as dots instead of fading their color in the consensus view. |
| disagreement | a logical value. Displays characters that disagreement to consensus(excludes ambiguous disagreements). |
| ignore_gaps | a logical value. When selected TRUE, gaps in column are treated as if that row didn't exist. |
| ref | a character string. Specifying the reference sequence which should be one of input sequences when 'consensus_views' is TRUE. |
| position | Position adjustment, either as a string, or the result of a call to a position adjustment function, default is 'identity' meaning 'position_identity()'. |
| show.legend | logical. Should this layer be included in the legends? |
| dms | logical. |
| position_color | logical. |
| ... | additional parameter |

Value

A list

Author(s)

Guangchuang Yu, Lang Zhou seq_name' work position_highlight' work border' work none_bg' work

Examples

```
library(ggplot2)
aln <- system.file("extdata", "sample.fasta", package = "ggmsa")
tidy_aln <- tidy_msa(aln, start = 150, end = 170)
ggplot() + geom_msa(data = tidy_aln, font = NULL) + coord_fixed()
```

`geom_msaBar`*geom_msaBar*

Description

Multiple sequence alignment layer for ggplot2. It plot sequence conservation bar.

Usage

```
geom_msaBar()
```

Value

A list

Author(s)

Lang Zhou

Examples

```
#plot multiple sequence alignment and conservation bar.  
f <- system.file("extdata/sample.fasta", package="ggmsa")  
ggmsa(f, 221, 280, font = NULL, seq_name = TRUE) + geom_msaBar()
```

`geom_seed`*geom_seed*

Description

Highlighting the seed in miRNA sequences

Usage

```
geom_seed(seed, star = FALSE)
```

Arguments

`seed` a character string.Specifying the miRNA seed sequence like 'GAGGUAG'.
`star` a logical value indicating whether asterisks should be displayed.

Value

a ggplot layer

Author(s)

Lang Zhou

Examples

```
miRNA_sequences <- system.file("extdata/seedSample.fa", package="ggmsa")
ggmsa(miRNA_sequences, font = 'DroidSansMono',
      color = "Chemistry_NT", none_bg = TRUE) +
geom_seed(seed = "GAGGUAG", star = FALSE)
ggmsa(miRNA_sequences, font = 'DroidSansMono',
      color = "Chemistry_NT") +
geom_seed(seed = "GAGGUAG", star = TRUE)
```

geom_seqlogo

geom_seqlogo

Description

Multiple sequence alignment layer for ggplot2. It plot sequence motifs.

Usage

```
geom_seqlogo(
  font = "DroidSansMono",
  color = "Chemistry_AA",
  adaptive = TRUE,
  top = TRUE,
  custom_color = NULL,
  show.legend = FALSE,
  ...
)
```

Arguments

| | |
|--------------|--|
| font | font families, possible values are 'helvetica', 'mono', and 'DroidSansMono', 'TimesNewRoman'. Defaults is 'DroidSansMono'. |
| color | A Color scheme. One of 'Clustal', 'Chemistry_AA', 'Shapely_AA', 'Zappo_AA', 'Taylor_AA', 'LETTER', 'CN6', 'Chemistry_NT', 'Shapely_NT', 'Zappo_NT', 'Taylor_NT'. Defaults is 'Chemistry_AA'. |
| adaptive | A logical value indicating whether the overall height of seqlogo corresponds to the number of sequences. If is FALSE, seqlogo overall height = 4, fixedly. |
| top | A logical value. If TRUE, seqlogo is aligned to the top of MSA. |
| custom_color | A data frame with two cloumn called "names" and "color".Customize the color scheme. |
| show.legend | logical. Should this layer be included in the legends? |
| ... | additional parameter |

Value

A list

Author(s)

Lang Zhou

Examples

```
#plot multiple sequence alignment and sequence motifs
f <- system.file("extdata/LeaderRepeat_All.fa", package="ggmsa")
ggmsa(f,font = NULL,color = "Chemistry_NT") + geom_seqlogo()
```

gghelix

gghelix

Description

Plots nucleotide secondary structure as helices in arc diagram

Usage

```
gghelix(helix_data, color_by = "length", overlap = FALSE)
```

Arguments

| | |
|------------|--|
| helix_data | a data frame. The file of nucleotide secondary structure and then read by readSSfile(). |
| color_by | generate colors for helices by various rules, including integer counts and value ranges one of "length" and "value" |
| overlap | Logicals. If TRUE, two structures data called predict and known must be given(eg:helix_data = list(known = data1, predicted = data2)), plots the predicted helices that are known on top, predicted helices that are not known on the bottom, and finally plots unpredicted helices on top in black. |

Value

ggplot object

Author(s)

Lang Zhou

Examples

```
RF03120 <- system.file("extdata/Rfam/RF03120_SS.txt", package="ggmsa")
helix_data <- readSSfile(RF03120, type = "Vienna")
gghelix(helix_data)
```

`ggmaf``ggmaf`

Description

plot MAF

Usage

```
ggmaf(  
  data,  
  ref,  
  block_start = NULL,  
  block_end = NULL,  
  facet_field = NULL,  
  heights = c(0.4, 0.6),  
  facet_heights = NULL  
)
```

Arguments

| | |
|----------------------------|--|
| <code>data</code> | a tidy MAF data frame. You can get it by <code>tidy_maf_df()</code> |
| <code>ref</code> | character, the name of reference genome. eg: "hg38.chr1_KI270707v1_random" |
| <code>block_start</code> | a numeric vector(>0). The start block to plot. |
| <code>block_end</code> | a numeric vector(< max block). The end block to plot. |
| <code>facet_field</code> | a numeric vector. The field in a facet panel. |
| <code>heights</code> | two numeric vector. The plot proportion between "Genomic location" panel(upon) and "Alignment" panel(down). Default:c(0.4,0.6) |
| <code>facet_heights</code> | Numeric vectors. The facet proportion. |

Value

ggplot object

Author(s)

Lang Zhou

| | |
|-------|-------|
| ggmsa | ggmsa |
|-------|-------|

Description

Plot multiple sequence alignment using ggplot2 with multiple color schemes supported.

Usage

```
ggmsa(
  msa,
  start = NULL,
  end = NULL,
  font = "helvetica",
  color = "Chemistry_AA",
  custom_color = NULL,
  char_width = 0.9,
  none_bg = FALSE,
  by_conservation = FALSE,
  position_highlight = NULL,
  seq_name = NULL,
  border = NULL,
  consensus_views = FALSE,
  use_dot = FALSE,
  disagreement = TRUE,
  ignore_gaps = FALSE,
  ref = NULL,
  show.legend = FALSE
)
```

Arguments

| | |
|--------------|--|
| msa | Multiple aligned sequence files or objects representing either nucleotide sequences or AA sequences. |
| start | a numeric vector. Start position to plot. |
| end | a numeric vector. End position to plot. |
| font | font families, possible values are 'helvetica', 'mono', and 'DroidSansMono', 'TimesNewRoman'. Defaults is 'helvetica'. If font = NULL, only plot the background tile. |
| color | a Color scheme. One of 'Clustal', 'Chemistry_AA', 'Shapely_AA', 'Zappo_AA', 'Taylor_AA', 'LETTER', 'CN6', 'Chemistry_NT', 'Shapely_NT', 'Zappo_NT', 'Taylor_NT'. Defaults is 'Chemistry_AA'. |
| custom_color | A data frame with two column called "names" and "color".Customize the color scheme. |
| char_width | a numeric vector. Specifying the character width in the range of 0 to 1. Defaults is 0.9. |

| | |
|---------------------------------|---|
| <code>none_bg</code> | a logical value indicating whether background should be displayed. Defaults is FALSE. |
| <code>by_conservation</code> | a logical value. The most conserved regions have the brightest colors. |
| <code>position_highlight</code> | A numeric vector of the position that need to be highlighted. |
| <code>seq_name</code> | a logical value indicating whether sequence names should be displayed. Defaults is 'NULL' which indicates that the sequence name is displayed when 'font = null', but 'font = char' will not be displayed. If 'seq_name = TRUE' the sequence name will be displayed in any case. If 'seq_name = FALSE' the sequence name will not be displayed under any circumstances. |
| <code>border</code> | a character string. The border color. |
| <code>consensus_views</code> | a logical value that opening consensus views. |
| <code>use_dot</code> | a logical value. Displays characters as dots instead of fading their color in the consensus view. |
| <code>disagreement</code> | a logical value. Displays characters that disagreement to consensus(excludes ambiguous disagreements). |
| <code>ignore_gaps</code> | a logical value. When selected TRUE, gaps in column are treated as if that row didn't exist. |
| <code>ref</code> | a character string. Specifying the reference sequence which should be one of input sequences when 'consensus_views' is TRUE. |
| <code>show.legend</code> | logical. Should this layer be included in the legends? |

Value

ggplot object

Author(s)

Guangchuang Yu

Examples

```
#plot multiple sequences by loading fasta format
fasta <- system.file("extdata", "sample.fasta", package = "ggmsa")
ggmsa(fasta, 164, 213, color="Chemistry_AA")

## Not run:
#XMultipleAlignment objects can be used as input in the 'ggmsa'
AAMultipleAlignment <- readAAMultipleAlignment(fasta)
ggmsa(AAMultipleAlignment, 164, 213, color="Chemistry_AA")

#XStringSet objects can be used as input in the 'ggmsa'
AAStringSet <- readAAStringSet(fasta)
ggmsa(AAStringSet, 164, 213, color="Chemistry_AA")

#Xbin objects from 'seqmagick' can be used as input in the 'ggmsa'
```



```
AAbin <- fa_read(fasta)
ggmsa(AAbin, 164, 213, color="Chemistry_AA")

## End(Not run)
```

ggSeqBundle

ggSeqBundle

Description

plot Sequence Bundles for MSA based 'ggolot2'

Usage

```
ggSeqBundle(
  msa,
  line_widch = 0.3,
  line_thickness = 0.3,
  line_high = 0,
  spline_shape = 0.3,
  size = 0.5,
  alpha = 0.2,
  bundle_color = c("#2ba0f5", "#424242"),
  lev_molecule = c("-", "A", "V", "L", "I", "P", "F", "W", "M", "G", "S", "T", "C",
    "Y", "N", "Q", "D", "E", "K", "R", "H")
)
```

Arguments

| | |
|----------------|---|
| msa | Multiple sequence alignment file(FASTA) or object for representing either nucleotide sequences or peptide sequences. Also receives multiple MSA files. eg: msa = c("Gram-negative_AKL.fasta", "Gram-positive_AKL.fasta"). |
| line_widch | The width of bundles at each site, default is 0.3. |
| line_thickness | The thickness of bundles at each site, default is 0.3. |
| line_high | The high of bundles at each site, default is 0. |
| spline_shape | A numeric vector of values between -1 and 1, which control the shape of the spline relative to the control points. From geom_xspline() in ggalt package. |
| size | A numeric vector of values between 0 and 1, which control the size of each lines. |
| alpha | A numeric vector of values between 0 and 1, which control the alpha of each lines. |
| bundle_color | The colors of each sequence bundles. eg: bundle_color = c("#2ba0f5", "#424242"). |
| lev_molecule | Reassigning the Y-axis and displaying letter-coded amino acids/nucleotides arranged by physiochemical properties or others. eg: amino acids hydrophobicity lev_molecule = c("-", "A", "V", "L", "I", "P", "F", "W", "M", "G", "S", "T", "C", "Y", "N", "Q", "D", "E", "K", "R", "H"). |

Value

ggplot object

Author(s)

Lang Zhou

Examples

```
aln <- system.file("extdata", "Gram-negative_AKL.fasta", package = "ggmsa")
ggSeqBundle(aln)
```

Gram-negative_AKL.fasta

Gram-negative_AKL

Description

Amino acids in the adenylate kinase lid (AKL) domain from Gram-negative bacteria.

Format

A MSA fasta with 100 sequences and 36 positions.

Source

<http://biovis.net/year/2013/info/redesign-contest>

Gram-positive_AKL.fasta

Gram-positive_AKL

Description

Amino acids in the adenylate kinase lid (AKL) domain from Gram-positive bacteria.

Format

A MSA fasta with 100 sequences and 36 positions.

Source

<http://biovis.net/year/2013/info/redesign-contest>

GVariation

GVariation

Description

A folder containing 4 MAS files as a sample data set to identify the sequence recombination event.

Format

a folder

Details

- A.Mont.fas MSA with sequences of 'Mont' and 'CF_YL21'
- B.Oz.fas MSA with sequences of 'Oz' and 'CF_YL21'
- C.Wilga5.fas MSA with sequences of 'Wilga5' and 'CF_YL21'
- sample_alignment.fa MSA with sequences of 'Mont', 'CF_YL21', 'Oz', and 'Wilga5'

Source

<https://link.springer.com/article/10.1007/s11540-015-9307-3>

LeaderRepeat_All.fa

A sample DNA alignment sequences

Description

DNA alignment sequences with 24 sequences and 56 positions.

Format

A MSA fasta

| | |
|-----------|------------------|
| merge_seq | <i>merge_seq</i> |
|-----------|------------------|

Description

merge two MSA

Usage

```
merge_seq(previous_seq, gap, subsequent_seq, adjust_name = TRUE)
```

Arguments

| | |
|----------------|--------------------------------------|
| previous_seq | previous MSA |
| gap | gap length |
| subsequent_seq | subsequent MSA |
| adjust_name | logical value. merge seq name or not |

Value

tidy MSA data frame

Author(s)

Lang Zhou

| | |
|------|---------------------------------------|
| plot | <i>plot method for SeqDiff object</i> |
|------|---------------------------------------|

Description

plot method for SeqDiff object

Usage

```
## S4 method for signature 'SeqDiff,ANY'
plot(
  x,
  width = 50,
  title = "auto",
  xlab = "Nucleotide Position",
  by = "bar",
  fill = "firebrick",
  colors = c(A = "#ff6d6d", C = "#769dcc", G = "#f2be3c", T = "#74ce98"),
  xlim = NULL
)
```

Arguments

| | |
|--------|--------------------------------------|
| x | SeqDiff object |
| width | bin width |
| title | plot title |
| xlab | xlab |
| by | one of 'bar' and 'area' |
| fill | fill color of upper part of the plot |
| colors | color of lower part of the plot |
| xlim | limits of x-axis |

Value

plot

Author(s)

guangchuang yu

Examples

```
fas <- list.files(system.file("extdata", "GVariation", package="ggmsa"),
                  pattern="fas", full.names=TRUE)
x1 <- seqdiff(fas[1], reference=1)
plot(x1)
```

readSSfile

readSSfile

Description

Read secondary structure file

Usage

```
readSSfile(file, type = NULL)
```

Arguments

| | |
|------|--|
| file | A text file in connect format |
| type | file type. one of "Helix", "Connect", "Vienna" and "Bpseq" |

Value

data frame

Author(s)

Lang Zhou

Examples

```
RF03120 <- system.file("extdata/Rfam/RF03120_SS.txt", package="ggmsa")
helix_data <- readSSfile(RF03120, type = "Vienna")
```

| | |
|----------|-----------------|
| read_maf | <i>read_maf</i> |
|----------|-----------------|

Description

read 'multiple alignment format'(MAF) file

Usage

```
read_maf(multiple_alignment_format)
```

Arguments

```
multiple_alignment_format
    a multiple alignment format(MAF) file
```

Value

data frame

Author(s)

Lang Zhou

| | |
|-----------|------------------|
| reset_pos | <i>reset_pos</i> |
|-----------|------------------|

Description

reset MSA position

Usage

```
reset_pos(seq_df)
```

Arguments

```
seq_df          MSA data
```

Value

data frame

Author(s)

Lang Zhou

Rfam

Rfam

Description

A folder containing seed alignment sequences and corresponding consensus RNA secondary structure.

Format

a folder

Details

- RF00458.fasta seed alignment sequences of Cripavirus internal ribosome entry site (IRES)
- RF03120.fasta seed alignment sequences of Sarbecovirus 5'UTR
- RF03120_SS.txt consensus RNA secondary structure of Sarbecovirus 5'UTR

Source

<https://rfam.xfam.org/>

sample.fasta

A sample data used in ggmsa

Description

A dataset containing the alignment sequences of the phenylalanine hydroxylase protein (PH4H) within nine species

Format

A MSA fasta with 9 sequences and 456 positions.

seedSample.fa *microRNA data used in ggmsa*

Description

Fasta format sequences of mature miRNA sequences from miRBase

Format

A MSA fasta with 6 sequences and 22 positions.

Source

<https://www.mirbase.org/ftp.shtml>

seqdiff *seqdiff*

Description

calculate difference of two aligned sequences

Usage

```
seqdiff(fasta, reference = 1)
```

Arguments

| | |
|-----------|---|
| fasta | fasta file |
| reference | which sequence serve as reference, 1 or 2 |

Value

SeqDiff object

Author(s)

guangchuang yu

Examples

```
fas <- list.files(system.file("extdata", "GVariation", package="ggmsa"),
                  pattern="fas", full.names=TRUE)
seqdiff(fas[1], reference=1)
```

| | |
|---------|----------------|
| seqlogo | <i>seqlogo</i> |
|---------|----------------|

Description

plot sequence logo for MSA based 'ggolot2'

Usage

```
seqlogo(
  msa,
  start = NULL,
  end = NULL,
  font = "DroidSansMono",
  color = "Chemistry_AA",
  adaptive = FALSE,
  top = FALSE,
  custom_color = NULL
)
```

Arguments

| | |
|--------------|--|
| msa | Multiple sequence alignment file or object for representing either nucleotide sequences or peptide sequences. |
| start | Start position to plot. |
| end | End position to plot. |
| font | font families, possible values are 'helvetica', 'mono', and 'DroidSansMono', 'TimesNewRoman'. Defaults is 'DroidSansMono'. If font=NULL, only the background tiles is drawn. |
| color | A Color scheme. One of 'Clustal', 'Chemistry_AA', 'Shapely_AA', 'Zappo_AA', 'Taylor_AA', 'LETTER', 'CN6', 'Chemistry_NT', 'Shapely_NT', 'Zappo_NT', 'Taylor_NT'. Defaults is 'Chemistry_AA'. |
| adaptive | A logical value indicating whether the overall height of seqlogo corresponds to the number of sequences. If FALSE, seqlogo overall height = 4, fixedly. |
| top | A logical value. If TRUE, seqlogo is aligned to the top of MSA. |
| custom_color | A data frame with two cloumn called "names" and "color".Customize the color scheme. |

Value

ggplot object

Author(s)

Lang Zhou

Examples

```
#plot sequence motif independently
nt_sequence <- system.file("extdata", "LeaderRepeat_All.fa",
                           package = "ggmsa")
seqlogo(nt_sequence, color = "Chemistry_NT")
```

```
sequence-link-tree.fasta
      sequence-link-tree
```

Description

Alignment sequences used to demonstrate circular MSA layout

Format

A MSA fasta with 28 sequences and 480 positions.

```
show      show method
```

Description

show method

Usage

```
show(object)
```

Arguments

object SeqDiff object

Value

message

Examples

```
fas <- list.files(system.file("extdata", "GVariation", package="ggmsa"),
                  pattern="fas", full.names=TRUE)
x1 <- seqdiff(fas[1], reference=1)
x1
```

| | |
|----------------|-----------------------|
| simplify_hdata | <i>simplify_hdata</i> |
|----------------|-----------------------|

Description

reset hdata data position

Usage

```
simplify_hdata(hdata, sim_msa)
```

Arguments

| | |
|---------|------------------------|
| hdata | data from tidy_hdata() |
| sim_msa | MSA data frame |

Value

data frame

Author(s)

Lang Zhou

| | |
|---------|----------------|
| simplot | <i>simplot</i> |
|---------|----------------|

Description

Sequence similarity plot

Usage

```
simplot(  
  file,  
  query,  
  window = 200,  
  step = 20,  
  group = FALSE,  
  id,  
  sep,  
  sd = FALSE,  
  smooth = FALSE,  
  smooth_params = list(method = "loess", se = FALSE)  
)
```

Arguments

| | |
|---------------|--|
| file | alignment fast file |
| query | query sequence |
| window | sliding window size (bp) |
| step | step size to slide the window (bp) |
| group | whether grouping sequence.(eg. For "A-seq1,A-seq-2,B-seq1 and B-seq2", using sep = "-" and id = 1 to divide sequences into groups A and B) |
| id | position to extract id for grouping; only works if group = TRUE |
| sep | separator to split sequence name; only works if group = TRUE |
| sd | whether display standard deviation of similarity among each group; only works if group=TRUE |
| smooth | FALSE(default)or TRUE; whether display smoothed spline. |
| smooth_params | a list that add params for geom_smooth, (default: smooth_params = list(method = "loess", se = FALSE)) |

Value

ggplot object

Author(s)

guangchuang yu

Examples

```
fas <- system.file("extdata/GVariation/sample_alignment.fa",
                  package="ggmsa")
simplot(fas, 'CF_YL21')
```

theme_msa

theme_msa

Description

Theme for ggmsa.

Usage

```
theme_msa()
```

Author(s)

Lang Zhou

| | |
|------------|-------------------|
| tidy_hdata | <i>tidy_hdata</i> |
|------------|-------------------|

Description

tidy protein-protein interactive position data

Usage

```
tidy_hdata(gap, inter, previous_seq, subsequent_seq)
```

Arguments

| | |
|----------------|---|
| gap | gap length |
| inter | protein-protein interactive position data |
| previous_seq | previous MSA |
| subsequent_seq | subsequent MSA |

Value

helix data

Author(s)

Lang Zhou

| | |
|-------------|--------------------|
| tidy_maf_df | <i>tidy_maf_df</i> |
|-------------|--------------------|

Description

tidy MAF data frame

Usage

```
tidy_maf_df(maf_df, ref)
```

Arguments

| | |
|--------|--|
| maf_df | a MAF data frame. You can get it by read_maf() |
| ref | character, the name of reference genome. eg: "hg38.chr1_KI270707v1_random" |

Value

data frame

Author(s)

Lang Zhou

| | |
|----------|-----------------|
| tidy_msa | <i>tidy_msa</i> |
|----------|-----------------|

Description

Convert msa file/object to tidy data frame.

Usage

```
tidy_msa(msa, start = NULL, end = NULL)
```

Arguments

| | |
|-------|--|
| msa | multiple sequence alignment file or sequence object in DNAStrngSet, RNAS-trngSet, AAStringSet, BStringSet, DNAMultipleAlignment, RNAMultipleAlign-ment, AAMultipleAlignment, DNABin or AABin |
| start | start position to extract subset of alignment |
| end | end position to extract subset of alignemnt |

Value

tibble data frame

Author(s)

Guangchuang Yu

Examples

```
fasta <- system.file("extdata", "sample.fasta", package = "ggmsa")
aln <- tidy_msa(msa = fasta, start = 10, end = 100)
```

| | |
|---------|-----------------|
| tp53.fa | <i>TP53 MSA</i> |
|---------|-----------------|

Description

Alignment sequences of used to show graphical combination

Format

A MSA fasta with 5 sequences and 404 positions.

| | |
|-----------------|---------------------|
| TP53_genes.xlsx | <i>genome locus</i> |
|-----------------|---------------------|

Description

The local genome map shows the 30000 sites around the TP53 gene.

Format

xlsx

| | |
|--------------|---------------------|
| treeMSA_plot | <i>treeMSA_plot</i> |
|--------------|---------------------|

Description

plot Tree-MSA plot

Usage

```
treeMSA_plot(
  p_tree,
  tidymsa_df,
  ancestral_node = "none",
  sub = FALSE,
  panel = "MSA",
  font = NULL,
  color = "Chemistry_AA",
  seq_colname = NULL,
  ...
)
```

Arguments

| | |
|-----------------------------|---|
| <code>p_tree</code> | tree view |
| <code>tidymsa_df</code> | tidy MSA data |
| <code>ancestral_node</code> | vector, internal node in tree. Assigning a internal node to display "ancestral sequences", If <code>ancestral_node = "none"</code> hides all ancestral sequences, if <code>ancestral_node = "all"</code> shows all ancestral sequences. |
| <code>sub</code> | logical value. Displaying a subset of ancestral sequences or not. |
| <code>panel</code> | panel name for plot of MSA data |
| <code>font</code> | font families, possible values are 'helvetica', 'mono', and 'DroidSansMono', 'TimesNewRoman'. Defaults is 'helvetica'. If <code>font = NULL</code> , only plot the background tile. |

| | |
|-------------|--|
| color | a Color scheme. One of 'Clustal', 'Chemistry_AA', 'Shapely_AA', 'Zappo_AA', 'Taylor_AA', 'LETTER', 'CN6', 'Chemistry_NT', 'Shapely_NT', 'Zappo_NT', 'Taylor_NT'. Defaults is 'Chemistry_AA'. |
| seq_colname | the colname of MSA on tree\$data |
| ... | additional parameters for 'geom_msa' |

Details

'treeMSA_plot()' automatically re-arranges the MSA data according to the tree structure,

Value

ggplot object

Author(s)

Lang Zhou

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