Package 'rivervis'

May 19, 2015

Type Package

Title River Visualisation Tool

Version 0.46.0

Date 2015-05-18

Author Feng Mao <rivervis@outlook.com>, Yichuan Shi <yichuan@live.com>, and Keith Richards <ksr10@cam.ac.uk>

Maintainer Feng Mao <rivervis@outlook.com>

Description This R package is a flexible and efficient tool to visualise both quantitative and qualitative data from river surveys. It can be used to produce diagrams with the topological structure of the river network.

License GPL (>= 2)

Encoding UTF-8

Repository CRAN

NeedsCompilation no

Date/Publication 2015-05-19 00:26:31

R topics documented:

`rivervis-package` *rivervis Package: River Visualisation Tool*

Description

The **rivervis** package is designed to visualise river ecosystem data.

Details

In general, the **rivervis** package draws two types of diagrams - river charts and river block charts. River charts can present points, lines, bars and blocks in relation to the topological structure of the river network. River block charts show qualitative data without the river network structure. It is recommended to run the examples below and in each function manual. The **rivervis** package contains 15 functions in total.

RiverLayout This calculates best fit plotting coordinates for rivers to be shown on river charts. The output is a list, which is used when plotting the river chart and the information on the river chart. It provides an opportunity to change the coordinates and other plotting parameters before actually plotting.

RiverDraw This plots the river charts according to the output list of `RiverLayout`.

RiverMap This can be understood as a combination of `RiverLayout` and `RiverDraw`. It not only calculates best fit plotting coordinates for rivers to be shown on river charts, but also plots the river charts according to the calculated coordinates. This implies that the coordinates cannot be changed before river chart plotting.

RiverFrame This plots river frames, lead lines and archor points.

RiverPoint This plots points or broken lines on the river chart.

RiverBar This plots bars for quantitative data on the river chart.

RiverBlock This plots blocks for qualitative data on the river chart.

RiverSite This plots sites of interest on the river chart.

RiverLabel This adds the name labels to the plotted rivers.

RiverTM This adds tick marks to the river chart.

RiverAxisLabel This adds left or right axis labels to the river chart.

RiverReach This highlights river reaches on the river chart.

RiverDirection This adds a flow direction arrow on the river chart.

RiverScale This adds a plotting scale on the river chart.

RiverBlockChart This function plots a river block chart for qualitative data without the topological structure of the river network. The function does not require the output list from `RiverLayout` or `RiverMap`.

Author(s)

Feng Mao, Yichuan Shi, and Keith Richards

Examples

```
data(Ballinderry)

riverlayout <- RiverLayout(B.river$River, B.river$Length, B.river$Parent,
                           B.river$Position, B.river$Distance, direction = -1)

# Example Figure 1

RiverDraw(riverlayout)
RiverLabel(riverlayout, offset = -1, corner = "lt", srt = 0, adj = c(0, -0.7))

RiverBar(B.siteaspt$Site, B.siteaspt$River, B.siteaspt$Distance,
         B.siteaspt[4:5], riverlayout, range = c(0,8),
         bar.col = c("#5381FFFF", "#FF3931FF"),lbl.adj = c(0.5,1.3))

RiverPoint(B.sitenh4n$Site, B.sitenh4n$River, B.sitenh4n$Distance,
           B.sitenh4n$NH4N_Spring, riverlayout, type = "o",
           pt.col = "#5381FFFF", pt.pch = 21, pt.bg = "lightblue")
RiverPoint(B.sitenh4n$Site, B.sitenh4n$River, B.sitenh4n$Distance,
           B.sitenh4n$NH4N_Autumn, riverlayout, type = "o",
           pt.col = "#FF3931FF", pt.pch = 21, pt.bg = "pink")

RiverSite(B.town$Town, B.town$River, B.town$Distance, B.town$Group,
          riverlayout, pt.pch = 22, lbl.shw = FALSE,
          pt.bg = "orange", pt.col = "black")

RiverSite(B.soi$SOI, B.soi$River, B.soi$Distance, B.soi$Group, riverlayout,
          pt.pch = c(25, 24, NA), lbl.shw = FALSE, pt.bg = NA, pt.col = "black")

RiverTM(c(0,2,4,6,8,10), B.siteaspt[4:5], riverlayout, pos=-1, side = "L",
        range = c(0,8), label = c(0,2,4,6,8))

RiverTM(c(0,0.04,0.08,0.12), B.sitenh4n[4:5], riverlayout, pos=-1, side = "R",
        range = c(0,0.15), label = c(0,0.04,0.08,0.12))

RiverAxisLabel("ASPT score", riverlayout, adj = c(0.5, -3))

RiverAxisLabel(expression(paste("N ",H[4],"-N (mg/L)")),
               riverlayout, side = "R",
               srt = 270, adj = c(0.5, -3))

legend(0.8, 0.43, inset=0.05, title = "Legend",
       c("ASPT Spring", "ASPT Autumn",
         expression(paste(NH[4],"-N Spring")),
         expression(paste(NH[4],"-N Autumn")),
         "Town", "Unshown left tribs",
         "Unshown right tribs"),
       lty = c(-1,-1,1,1,-1,-1,-1),
```

```
       pch = c(22,22, 21,21, 22, 25, 24),
       col= c("black", "black", "#5381FFFF", "#FF3931FF",
              "black", "black", "black"),
       pt.bg = c("#5381FFFF", "#FF3931FF", "lightblue",
                 "pink", "orange", NA, NA),
       pt.cex = c(2, 2, 1, 1, 1,1,1),
       cex = 0.8)

RiverScale(2, "2 km", riverlayout, loc = c(0.6, 0.10),lbl.cex = 0.8)

RiverDirection(riverlayout, arw.length = 0.03,
               loc = c(0.6, 0.05), lbl.cex = 0.8)

# Example Figure 2

RiverDraw(riverlayout)
RiverLabel(riverlayout, offset = -1, corner = "lt",
           srt = 0, adj = c(0, -0.7))

RiverReach(B.reach$Reach, B.reach$River, B.reach$From, B.reach$To,
           B.reach$Group, B.reach$Style, riverlayout, rea.lwd = 4,
           rea.lty = 3,rea.col = "#51B0A8FF")

RiverPoint(NA,B.elevation$River, B.elevation$Distance,
           B.elevation$Elevation, riverlayout)

RiverTM(c(0, 100, 200, 300, 400, 500), B.elevation[3], riverlayout,
        pos=-1, side = "R", range = c(0,500),
        label = c(0, 100, 200, 300, 400, 500))

RiverAxisLabel("Elevation (m)", riverlayout, side = "R",
               srt = 270, adj = c(0.5, -4))

RiverBlock(B.sitehm$Site, B.sitehm$River, B.sitehm$Distance,
           B.sitehm[4:9], riverlayout, c(1,1,2,2),
           block.col = fivecolours, lbl.adj = c(0.5,1.3),
           par.txt = c("ChanVeg", "ChanFlow", "BankVegLeft",
                       "Right", "RipLULeft", "Right"))

legend(0.8, 0.43, inset=0.05,title = "Legend",
       c("High", "Good", "Moderate", "Poor", "Bad",
         "Elevation", "Upper Ballinderry SAC"),
       pch = c(22,22,22,22,22,NA,22),
       pt.bg = c(fivecolours, "black","#51B0A8FF"),
       pt.cex = c(2,2,2,2,2,NA,3),
       lty = c(NA,NA,NA,NA,NA,1,NA),
       cex = 0.8)

RiverScale(2, "2 km", riverlayout, loc = c(0.6, 0.10),lbl.cex = 0.8)

RiverDirection(riverlayout, arw.length = 0.03,
               loc = c(0.6, 0.05), lbl.cex = 0.8)
```

```
# Figure 3

RiverBlockChart(B.sitehm$Site, B.sitehm$River, B.sitehm$Distance,
                B.sitehm[4:9],  c(1,1,2,2), mar = 0.15,
                site.ofs = 1, site.cex = 0.7,
                site.order = "R", block.col = fivecolours)

legend(0.88, 0.6, inset=0.05, title = "Legend",
       c("High", "Good", "Moderate", "Poor", "Bad"),
       border = rep("black", 5),
       fill = fivecolours,
       cex = 0.8)
```

`Ballinderry` *Ballinderry River Basin Dataset*

Description

A ballinderry river basin dataset for demonstrating purposes.

Details

This contains the following 8 datasets and 2 character vectors.

B.elevation This dataset can be used to plot elevation profile of Ballinderry Rivers. It is a data frame with 90 observations on the following 3 variables.

River Rivers on which the elevation sites are located

Distance The along-the-river distance between the elevation sites and the mouth of the river.

Elevation A numeric vector of elevation values

B.reach Selected Ballinderry River reaches. It is a data frame with 1 observation on the following 6 variables.

Reach Reach names.

River Rivers on which the monitoring sites are located.

From A numeric vector of starting points of reaches.

To A numeric vector of ending points of reaches.

Group A vector of reach group names. This indicates to which group the reaches belong.

Style A vector of reach styles and the location of reach lines.

B.river Main rivers and tributaries in Ballinderry Basin for `RiverMap` and `RiverLayout`. It is a data frame with 8 observations on the following 5 variables.

River River names.

Length Length of rivers.

Position Relative relations between rivers and their parent rivers.

Parent Parent rivers.

Distance Distance between the mouths of each river and the mouths of each river's parent.

B.siteaspt ASPT scores measured in the Ballinderry River Basin in Spring and Autumn, 2009. It is a data frame with 15 observations on the following 5 variables.

Site Site ID

River Rivers on which the sites are located

Distance" The along-the-river distance between the sites and the mouth of the river.

ASPT_Spring ASPT measure in Spring.

ASPT_Autumn ASPT measure in Autumn.

B.sitehm Selected hydromorphological results from RHAT. The hydromorphological variables are ordinary factors which have five grades: High, Good, Moderate, Poor and Bad. It is a data frame with 17 observations on the following 9 variables.

Site Monitorings sites.

River Rivers on which the monitoring sites are located.

Distance The along-the-river distance between the sites and the mouth of the river.

ChanVeg Channel vegetation condition.

ChanFlow Channel flow condition.

BankVegLeft Left bank vegetation condition.

BankVegRight Right bank vegetation condition.

RipLULeft Left riparian land-use condition.

RipLURight Right riparian land-use condition.

B.sitenh4n NH4-N values measured in the Ballinderry River Basin in Spring and Autumn, 2009. It is a data frame with 17 observations on the following 5 variables.

Site Site ID

River Rivers on which the sites are located

Distance" The along-the-river distance between the sites and the mouth of the river.

NH4N_Spring NH4-N measure in Spring.

NH4N_Autumn NH4-N measure in Autumn.

B.soi This dataset provides sites of interest in the Ballinderry River Basin. The sites have three types: towns, conjunctions of left and right tributaries. It is a data frame with 5 observations on the following 4 variables.

SOI Sites of interest.

River Rivers on which the sites are located.

Distance The along-the-river distance between the sites and the mouth of the river.

Group Groups of the sites.

B.town This dataset provides 2 main towns in the Ballinderry River Basin. It has the following 4 variables.

Town Town names.

River Rivers on which the sites are located.

Distance The along-the-river distance between the sites and the mouth of the river.

Group Groups of the sites.

fivegrades This vector contains five grades, which are High, Good, Moderate, Poor and Bad

fivecolours This vector contains five colours representing the five grades. The five colours are blue(#5381FFFF), green(#7BE859FF), yellow(#FFC944FF), orange(#E87539FF) and red(#FF3931FF).

Source

North Ireland Environment Agency

`RiverAxisLabel` *River Axis Labels*

Description

This adds left or right axis labels to the river chart.

Usage

```
RiverAxisLabel(label, riverlayout, cex = 0.7, adj = c(0.5, -2), srt = 90,
  col = "black", pos = NULL, offset = 0.5, side = "L",
  mainonly = TRUE)
```

Arguments

`label`	the axis label to be shown on the river chart.
`riverlayout`	the output list of `RiverLayout`.
`cex`	text size.
`adj`	text adjustment. One or two values in the range [0,1] for x and y (optional) adjustment.
`srt`	text angle.
`col`	text colour.
`pos`	text position. `1` for below, `2` for left, `3` for above, and `4` for right. See `par` for details.
`offset`	text position offset.
`side`	left (`"L"`) or right (`"R"`) axis.
`mainonly`	the axis title is only shown for the main stream only (`"TRUE"`) or not (`"FALSE"`).

Author(s)

Feng Mao

See Also

`RiverLayout`, `RiverDraw`, `RiverMap`. `par`.

Examples

```
# see examples below
data(Ballinderry)

riverlayout <- RiverLayout(B.river$River,B.river$Length,
                           B.river$Parent,B.river$Position,
                           B.river$Distance, direction = -1)
RiverDraw(riverlayout)

RiverBar(B.siteaspt$Site, B.siteaspt$River, B.siteaspt$Distance,
         B.siteaspt[4:5], riverlayout, range = c(0,8),
         bar.col = c("#5381FFFF", "#FF3931FF"), lbl.adj = c(0.5,1.3))

RiverTM(c(0,2,4,6,8,10), B.siteaspt[4:5], riverlayout,
        pos=-1, side = "L", range = c(0,8), label = c(0,2,4,6,8))

RiverAxisLabel("ASPT score", riverlayout, adj = c(0.5, -3))
```

RiverBar *River Bar-Chart*

Description

This plots bars for quantitative data on the river chart.

Usage

```
RiverBar(site, river, distance, value, riverlayout, range = NA, bar.w = 1,
  bar.col = NA, bd.col = "black", lbl.cex = 0.7, lbl.adj = c(0.5, 2),
  lbl.ofs = 0.5, lbl.col = "black", lbl.srt = 0, lbl.pos = NULL,
  lbl.shw = TRUE, pt.shw = FALSE)
```

Arguments

site	a character vector of site names.
river	a vector of rivers on which the sites are located.
distance	a vector. The along-the-river distances between the sites and the mouth of the river.
value	a data frame containing the variables to be shown on the bar-chart.
riverlayout	the output list of RiverLayout or RiverMap.
range	bar-chart value range. A vector of two values indicating lower limit and upper limit.
bar.w	relative width of each bar plotted in the diagram. The default value is 1.
bar.col	bar colour.
bd.col	bar border colour.

lbl.cex	label size.
lbl.adj	label adjustment. One or two values in [0,1] for x and y (optional) adjustment.
lbl.ofs	label position offset.
lbl.col	label colour.
lbl.srt	label angle.
lbl.pos	label position. 1 for below, 2 for left, 3 for above, and 4 for right. See par for details.
lbl.shw	show labels (TRUE) or not (FALSE).
pt.shw	show location point (TRUE) or not (FALSE).

Author(s)

Feng Mao

See Also

RiverLayout, RiverDraw, RiverMap, par.

Examples

```
data(Ballinderry)

riverlayout <- RiverLayout(B.river$River,B.river$Length,
                           B.river$Parent,B.river$Position,
                           B.river$Distance, direction = -1)

RiverDraw(riverlayout)

RiverBar(B.siteaspt$Site, B.siteaspt$River, B.siteaspt$Distance,
         B.siteaspt[4], riverlayout, range = c(0,8),
         bar.col = c("#5381FFFF"), lbl.adj = c(0.5,1.3))

RiverDraw(riverlayout)

RiverBar(B.siteaspt$Site, B.siteaspt$River, B.siteaspt$Distance,
         B.siteaspt[4:5], riverlayout, range = c(0,8),
         bar.col = c("#5381FFFF", "#FF3931FF"), lbl.adj = c(0.5,1.3))
```

RiverBlock *River Block-Chart*

Description

This plots blocks to display qualitative data on the river chart.

Usage

```
RiverBlock(site, river, distance, value, riverlayout, arrangement,
  pt.shw = FALSE, hw.rat = 1.5, h.gap = 0.05, w.gap = 0.025,
  block.col = NA, block.lwd = 1, bd.col = "grey20", par.shw = TRUE,
  par.pos = 2, par.ofs = 1, par.cex = 0.6, par.adj = c(1, 0.5),
  par.txt = NA, lbl.shw = TRUE, lbl.cex = 0.7, lbl.adj = c(0.5, 2),
  lbl.ofs = 0.5, lbl.col = "black", lbl.srt = 0, lbl.pos = NULL)
```

Arguments

site	a vector of site names.
river	a vector of rivers on which the sites are located.
distance	a vector. The along-the-river distances between the sites and the mouth of the river.
value	a data frame containing the qualitative variables to be shown on the block-chart.
riverlayout	the output list of RiverLayout or RiverMap.
arrangement	a vector indicating the block number for each line.
pt.shw	show location point (TRUE) or not (FALSE).
hw.rat	the ratio of block height and width in the plotted diagram.
h.gap	vertical gap size between blocks. By default, the vertical gap is river height * 0.05 in each river chart.
w.gap	horizontal gap size between blocks when there is more than one block in each line. By default, the horizontal gap is largest block width * 0.025.
block.col	block colour.
block.lwd	block line width.
bd.col	block border col.
par.shw	show parameter names (TRUE) or not (FALSE).
par.pos	parameter label position. 1 for below, 2 for left, 3 for above, and 4 for right. See par for details.
par.ofs	parameter label position offset.
par.cex	parameter label size.
par.adj	parameter label adjustment. One or two values in [0,1] for x and y (optional) adjustment.
par.txt	parameter name.
lbl.shw	show labels (TRUE) or not (FALSE).
lbl.cex	label size.
lbl.adj	label adjustment. One or two values in [0,1] for x and y (optional) adjustment.
lbl.ofs	label position offset.
lbl.col	label colour.
lbl.srt	label angle.
lbl.pos	label position. 1 for below, 2 for left, 3 for above, and 4 for right. See par for details.

Author(s)

Feng Mao

See Also

RiverLayout, RiverDraw, RiverMap, par.

Examples

```
data(Ballinderry)

riverlayout <- RiverLayout(B.river$River,B.river$Length,
                           B.river$Parent,B.river$Position,
                           B.river$Distance, direction = -1)
RiverDraw(riverlayout)

RiverBlock(B.sitehm$Site, B.sitehm$River, B.sitehm$Distance,
           B.sitehm[4:9], riverlayout, c(1,1,2,2),
           block.col = fivecolours, lbl.adj = c(0.5,1.3))

RiverDraw(riverlayout)

RiverBlock(B.sitehm$Site, B.sitehm$River, B.sitehm$Distance,
           B.sitehm[4:9], riverlayout, c(1,1,2,2),
           block.col = fivecolours, lbl.adj = c(0.5,1.3),
           par.txt = c("ChanVeg", "ChanFlow", "BankVegLeft",
                       "Right", "RipLULeft", "Right"))
```

RiverBlockChart *River Block Chart Plotting*

Description

This function plots a river block chart to display qualitative data without the topological structure of the river network. The function does not require the output list from RiverLayout or RiverMap.

Usage

```
RiverBlockChart(site, river, distance, value, arrangement, h.gap = 0.1,
  w.gap = 0.25, w.gap.s = 0.1, r.gap = 0.25, block.col = NA,
  block.lwd = 1, border.col = "grey20", bg.col = "lightgrey", mar = 0.1,
  hw.rat = 1.5, site.shw = TRUE, site.pos = 1, site.ofs = 1.5,
  site.cex = 0.5, site.col = "black", site.order = "A", site.srt = 0,
  rvr.shw = TRUE, rvr.ofs = 1.5, rvr.cex = 0.7, rvr.col = "black",
  rvr.t.b = "b", rvr.order = NA, rvr.srt = 0, par.shw = TRUE,
  par.pos = 2, par.ofs = 1, par.cex = 0.6, par.adj = c(1, 0.5),
  par.col = "black", par.txt = NA)
```

Arguments

site	a character vector of site names.
river	a vector of rivers to which the sites belong.
distance	a vector. The along-the-river distance between the site and the mouth of the river.
value	a data frame containing the qualitative variables to be shown on the river block-chart.
arrangement	a vector indicating the block number for each line.
h.gap	vertical gap size between blocks in the plot. By default, the vertical gap is block height * 0.1
w.gap	horizontal gap size between sites. By default, the horizontal gap is largest block width * 0.25.
w.gap.s	horizontal gap size between small blocks when there are more than one block in each line. By default, the horizontal gap is largest block width * 0.1.
r.gap	horizontal gap size between rivers. By default, gap between rivers is block width * 0.25.
block.col	a vector of block colours. The length of vector should be as the same as the the number of levels of value.
block.lwd	a value of block line width.
border.col	a value of block border colour.
bg.col	a value of river background colour.
mar	a value of smallest margin size.
hw.rat	the ratio of block height and block width.
site.shw	show site names (TRUE) or not (FALSE).
site.pos	site position. 1 for below, 2 for left, 3 for above, and 4 for right. See par for details.
site.ofs	site position offset.
site.cex	site name size.
site.col	site colour.
site.order	order of sites within each river. Alphabetical order ("A"), river flow left ("L"), river flow right ("R").
site.srt	site label rotation in degrees.
rvr.shw	show river labels (TRUE) or not (FALSE).
rvr.ofs	river label position offset.
rvr.cex	river label size.
rvr.col	river label colour.
rvr.t.b	location of river label. "t" for top (above) and "b" for below (bottom).
rvr.order	order of rivers. Alphabetical order (NA) or a vector of custom order.
rvr.srt	river label rotation in degrees.

par.shw	show parameter labels (TRUE) or not (FALSE).
par.pos	parameter label position. 1 for below, 2 for left, 3 for above, and 4 for right. See par for details. It overrides par.adj if par.pos is not NULL.
par.ofs	parameter label position offset.
par.cex	parameter label size.
par.adj	parameter label adjustment. One or two values in [0,1] for x and y (optional) adjustment.
par.col	parameter label colour.
par.txt	parameter name.

Author(s)

Feng Mao

See Also

par.

Examples

```
data(Ballinderry)

RiverBlockChart(B.sitehm$Site, B.sitehm$River, B.sitehm$Distance,
                B.sitehm[4:9],  c(1,1,2,2), mar = 0.15, site.ofs = 1,
                site.cex = 0.7, site.order = "R",
                block.col = fivecolours)

RiverBlockChart(B.sitehm$Site, B.sitehm$River, B.sitehm$Distance,
                B.sitehm[4:9],  c(1,1,2,2), mar = 0.15,
                site.ofs = 1, site.cex = 0.7,
                rvr.order = c("Rock", "Killymoon-Claggan", "Ballinderry",
                              "Ballymully", "Kildress", "Kingsmill",
                              "Lissan", "Tulnacross"),
                block.col = fivecolours)

RiverBlockChart(B.sitehm$Site, B.sitehm$River, B.sitehm$Distance,
                B.sitehm[4:9],  c(1,1,2,2), mar = 0.15, site.ofs = 1,
                site.cex = 0.7, site.order = "R",
                par.txt = c("ChanVeg", "ChanFlow", "BankVegLeft",
                            "Right", "RipLULeft", "Right"),
                block.col = fivecolours)
```

RiverDirection *River Direction Arrow*

Description

This plots river flow direction arrow on river charts.

Usage

```
RiverDirection(riverlayout, loc = NA, arw.length = 0.05, arw.lty = 1,
  arw.lwd = 1, arw.angle = 30, arw.col = "black",
  label = "Flow direction", lbl.cex = 0.5, lbl.pos = 4, lbl.ofs = 0.5)
```

Arguments

riverlayout	the output list of RiverLayout or RiverMap.
loc	location of arrow. One or two values in the range [0, 1] for left and bottom margin sizes. If loc = NA, use mouse to locate the arrow. ESC to confirm.
arw.length	arrow length.
arw.lty	arrow line style.
arw.lwd	arrow line width.
arw.angle	arrow head angle.
arw.col	arrow colour.
label	label of the arrow.
lbl.cex	label size.
lbl.pos	label position.
lbl.ofs	label position offset.

Author(s)

Feng Mao

See Also

RiverLayout, RiverDraw, RiverMap, par, locator, arrows.

Examples

```
data(Ballinderry)

riverlayout <- RiverLayout(B.river$River,B.river$Length,
                           B.river$Parent,B.river$Position,
                           B.river$Distance, direction = -1)
RiverDraw(riverlayout)
```

```
RiverDirection(riverlayout, arw.length = 0.03,
               loc = c(0.8, 0.05), lbl.cex = 0.8)

# Use mouse to allocate the flow direction sign
## RiverDirection(riverlayout, arw.length = 0.03, lbl.cex = 0.8)
```

`RiverDraw` *River Chart Plotting*

Description

This plots the river chart according to the output list provided by `RiverLayout`.

Usage

```
RiverDraw(riverlayout, bd.col = "black", ln.col = "grey40", ln.lty = 3,
  ln.lwd = 1, bg.col = "grey80", pt.shw = TRUE, pt.col = "black",
  pt.pch = 20, pt.bg = "black", pt.cex = 1, pt.lwd = 1, mar.t = 0.05,
  mar.b = 0.05, mar.l = 0.2, mar.r = 0.1)
```

Arguments

`riverlayout`	the output list of `RiverLayout`.
`bd.col`	border colour.
`ln.col`	lead line colour.
`ln.lty`	lead line style.
`ln.lwd`	lead line width.
`bg.col`	background colour.
`pt.shw`	show anchor point (`TRUE`) or not (`FALSE`). Anchor points represent the locations of the river mouths.
`pt.col`	anchor point colour.
`pt.pch`	anchor point style.
`pt.bg`	anchor point background(fill) colour when `pch=21:25`.
`pt.cex`	anchor point size.
`pt.lwd`	anchor point border width.
`mar.t`	top margin size.
`mar.b`	bottom margin size.
`mar.l`	left margin size.
`mar.r`	right margin size.

Author(s)

Feng Mao

See Also

RiverLayout, RiverMap, par.

Examples

```
data(Ballinderry)

# River flows right
riverlayout <- RiverLayout(B.river$River,B.river$Length,
                           B.river$Parent,B.river$Position,
                           B.river$Distance, direction = -1)
RiverDraw(riverlayout)

# River flows left
riverlayout.left <- RiverLayout(B.river$River,B.river$Length,
                                B.river$Parent,B.river$Position,
                                B.river$Distance)

RiverDraw(riverlayout.left)
```

RiverFrame *River Frame Plotting*

Description

This plots river frames, lead lines and archor points.

Usage

```
RiverFrame(riverlayout, ln.shw = T, ln.col = "grey40", ln.lty = 3,
  ln.lwd = 1, pt.shw = T, pt.col = "black", pt.pch = 20,
  pt.bg = "black", pt.cex = 1, pt.lwd = 1, bd.shw = T,
  bd.col = "black")
```

Arguments

riverlayout	the output list of RiverLayout.
ln.shw	show lead lines (TRUE) or not (FALSE).
ln.col	lead line colour.
ln.lty	lead line style.
ln.lwd	lead line width.
pt.shw	show anchor points (TRUE) or not (FALSE). Anchor points represent the locations of the river mouths.
pt.col	anchor point colour.
pt.pch	anchor point style.

pt.bg	anchor point background(fill) colour when pch=21:25.
pt.cex	anchor point size.
pt.lwd	anchor point border width.
bd.shw	show boarders (TRUE) or not (FALSE).
bd.col	border colour.

Author(s)

Feng Mao

See Also

RiverLayout, RiverMap, par.

Examples

```
data(Ballinderry)

riverlayout <- RiverLayout(B.river$River,B.river$Length,
                           B.river$Parent,B.river$Position,
                           B.river$Distance, direction = -1)
RiverDraw(riverlayout)

RiverFrame(riverlayout, bd.col = "green",
           pt.col = "red", ln.col = "orange")
```

RiverLabel *River Labels on River Charts*

Description

This adds the name labels to the plotted rivers.

Usage

```
RiverLabel(riverlayout, cex = 0.7, adj = c(0, -1), srt = 90,
  col = "black", pos = NULL, offset = 0.5, corner = "lb")
```

Arguments

riverlayout	the output list of RiverLayout or RiverMap.
cex	text size.
adj	text adjustment. One or two values in [0,1] for x and y (optional) adjustment.
srt	text angle.
col	text colour.

pos	text position. 1 for below, 2 for left, 3 for above, and 4 for right. See par for details. It overrides adj if it is not NULL.
offset	text position offset.
corner	river label position, which can be at any of the four river chart corners. "lt" for left-top, "lb" for left-bottom, "rt" for right-top, "rb" for right-bottom.

Author(s)

Feng Mao

See Also

RiverLayout, RiverDraw, RiverMap. par.

Examples

```
data(Ballinderry)

riverlayout <- RiverLayout(B.river$River,B.river$Length,
                           B.river$Parent,B.river$Position,
                           B.river$Distance, direction = -1)
RiverDraw(riverlayout)

RiverLabel(riverlayout, corner = "lt", srt = 0, adj = c(0, -0.7))

RiverLabel(riverlayout, corner = "lb")

RiverLabel(riverlayout, corner = "rt", srt = -90)
```

RiverLayout *River Layout Coordinates Calculation*

Description

This function calculates best fit plotting coordinates to enable rivers to be shown on river charts. The output is a list, which can be used when plotting the river chart and the information on the river chart. It provides an opportunity to change the coordinates and other plotting parameters before actually plotting.

Usage

```
RiverLayout(river, length, parent, position, distance, row = NA,
  direction = 1, margin = 0.5)
```

Arguments

river	a vector of river names.
length	a vector of river lengths.
parent	a vector of river parents. The parent of a river is the river into which it flows. The parent of the main stream is "NA".
position	a vector of river positions. The river position indicates its position relative to its parent - whether it is a left bank river, right bank river or main stream. The left bank river is on the left when looking downstream of its parent. The right bank river is on the right when looking downstream of its parent. The value of position can be "R", "L" or "M". For the main stream, the value is "M".
distance	a vector of distances denotes the distance between the mouths of each river and the mouths of each river's parent.
row	a vector of row numbers. The main stream is on row 0. In the river chart, rivers with negative row numbers are plotted below the main stream while rivers with positive row numbers are plotted above the main stream. If a value for row is provided, the rivers will be plotted according to the provided row numbers. If a value for row is not provided, a vector of best fit row numbers will be calculated before plotting.
direction	a value. In the river chart, rivers flow from right to left (`direction = 1`), or from left to right (`direction = -1`). By default, `direction = 1`.
margin	a value. The margin height between rivers in the topological plot. By default, `margin = 0.5` and margin height is 0.5 times the river height in the river chart.

Value

The `RiverLayout` returns a list containing the data for river chart plotting. The list includes,

riverdata	a data frame. This contains input vectors `river`, `length`, `parent`, `position` and `distance`. It also includes calculated x-coordinates of river mouths (`rmouth`) and sources (`rsource`), defined in the same units as the inputs `length` and `distance`. The last vector included is the row number for each river (`row`), in which the main stream has a fixed row number of 0.
H.MAX	the number of river rows.
H.SIZE	the height of each river row in the topological plot.
W.MAX	the width of river layout, in the same units as `length` and `distance`.
W.SIZE	the reciprocal of `W.MAX`.
X1	normalised x-coordinate of river mouths.
X2	normalised x-coordinate of river sources.
Y	normalised y-coordinate of rivers.
direction	flow direction. Rivers flow from right to left (`direction = 1`), or from left to right (`direction = -1`).

Note

There is one and only one mainstream input for each function call.

Author(s)

Feng Mao

See Also

RiverDraw, RiverMap.

Examples

```
data(Ballinderry)

# River flows right
riverlayout <- RiverLayout(B.river$River,B.river$Length,
                           B.river$Parent,B.river$Position,
                           B.river$Distance, direction = -1)

# River flows left
riverlayout.left <- RiverLayout(B.river$River,B.river$Length,
                                B.river$Parent,B.river$Position,
                                B.river$Distance)

str(riverlayout)
```

RiverMap *River Layout Coordinates Calculation and Plotting*

Description

This function calculates plotting coordinates for rivers and draws the river chart accordingly.

Usage

```
RiverMap(river, length, parent, position, distance, row = NA, direction = 1,
  margin = 0.5, bd.col = "black", ln.col = "grey40", ln.lty = 3,
  ln.lwd = 1, bg.col = "grey80", pt.shw = TRUE, pt.col = "black",
  pt.pch = 20, pt.bg = "black", pt.cex = 1, pt.lwd = 1, mar.t = 0.05,
  mar.b = 0.05, mar.l = 0.2, mar.r = 0.1)
```

Arguments

river	a vector of river names.
length	a vector of river lengths.
parent	a vector of river parents. The parent of a river is the river into which it flows. The parent of the main stream is NA.

position	a vector of river positions. The river position indicates its position relative to its parent - whether it is a left bank river, right bank river or main stream. The left bank river is on the left when looking downstream of its parent. The right bank river is on the right when looking downstream of its parent. The value of position can be "R", "L" or "M". For the main stream, the value is "M".
distance	a vector of distances denotes the distance between the mouths of each river and the mouths of each river's parent.
row	a vector of row numbers. The main stream is on row 0. In the river chart, rivers with negative row numbers are plotted below the main stream while rivers with positive row numbers are plotted above the main stream. If a value for row is provided, the rivers will be plotted according to the provided row numbers. If a value for row is not provided, a vector of best fit row numbers will be calculated before plotting.
direction	a value. In the river chart, rivers flow from right to left (direction = 1), or from left to right (direction = -1). By default, direction = 1.
margin	a value. The margin height between rivers in the topological plot. By default, margin = 0.5 and margin height is 0.5 times the river height in the river chart.
bd.col	river border colour.
ln.col	lead line colour.
ln.lty	lead line style.
ln.lwd	lead line width.
bg.col	background colour.
pt.shw	show anchor point (TRUE) or not (FALSE). Anchor points represent the locations of the river mouths.
pt.col	anchor point colour.
pt.pch	anchor point character.
pt.bg	anchor point background(fill) colour when pch=21:25.
pt.cex	anchor point size.
pt.lwd	anchor point border width.
mar.t	top margin size. This ranges in [0, 1] where 1 is the total height of the diagram region.
mar.b	bottom margin size. This ranges in [0, 1] where 1 is the total height of the diagram region.
mar.l	left margin size. This ranges in [0, 1] where 1 is the total width of the diagram region.
mar.r	right margin size. This ranges in [0, 1] where 1 is the total width of the diagram region.

Value

The RiverMap returns a list containing data for river map drawing, and plots the river map accordingly. The output list can be used for further plotting. The output list includes,

riverdata	a data frame. This contains input vectors river, length, parent, position and distance. It also includes calculated x-coordinates of river mouths (rmouth) and sources (rsource), defined in the same units as the inputs length and distance. The last included vector is the row number for each river (row), in which the main stream has a fixed row number of 0.
H.MAX	the number of rows.
H.SIZE	the height of each row in the topological plot.
W.MAX	the width of river layout, in the same units as length and distance.
W.SIZE	the reciprocal of W.MAX.
X1	normalised x-coordinate of river mouths.
X2	normalised x-coordinate of river sources.
Y	normalised y-coordinate of rivers.
direction	flow direction. Flow from right to left (direction = 1), or from left to right (direction = -1).

Author(s)

Feng Mao

See Also

RiverLayout, RiverDraw, par.

Examples

```
data(Ballinderry)

riverlayout <- RiverLayout(B.river$River,B.river$Length,
                           B.river$Parent,B.river$Position,
                           B.river$Distance, direction = -1)
str(riverlayout)

RiverMap(B.river$River,B.river$Length,B.river$Parent,
         B.river$Position, B.river$Distance)[[1]]

RiverMap(B.river$River,B.river$Length,B.river$Parent,
         B.river$Position, B.river$Distance,
         row = c(5,-1,6,3,-4,2,-6,7), direction = -1)
```

RiverPoint *Points on River Charts*

Description

This function plots scatter points or broken lines on the river chart.

Usage

```
RiverPoint(site, river, distance, value, riverlayout, range = NA,
  type = "l", pt.col = "grey40", pt.bg = "black", pt.pch = 20,
  pt.cex = 1, lbl.cex = 0.7, lbl.adj = c(0.5, 2), lbl.ofs = 0.5,
  lbl.col = "black", lbl.srt = 0, lbl.pos = NULL, lbl.shw = FALSE,
  ln.lwd = 1)
```

Arguments

site	a vector of site IDs.
river	a vector of river names.
distance	a vector of distances from sites to the river mouth.
value	a vector of values.
riverlayout	the output list of RiverLayout or RiverMap.
range	point value range. A vector of two values indicating lower limit and upper limit.
type	type of plot. See plot for details. The default value is "l", which means "lines".
pt.col	point or point border colour.
pt.bg	point point background(fill) colour when pt.pch=21:25.
pt.pch	point style.
pt.cex	point size.
lbl.cex	label size.
lbl.adj	label adjustment. One or two values in [0,1] for x and y (optional) adjustment.
lbl.ofs	label position offset.
lbl.col	label colour.
lbl.srt	label angle.
lbl.pos	label position. 1 for below, 2 for left, 3 for above, and 4 for right. See par for details.
lbl.shw	show labels (TRUE) or not (FALSE).
ln.lwd	line width.

Author(s)

Feng Mao

See Also

RiverLayout, RiverDraw, RiverMap, par.

Examples

```
data(Ballinderry)

riverlayout <- RiverLayout(B.river$River,B.river$Length,
                           B.river$Parent,B.river$Position,
                           B.river$Distance, direction = -1)

RiverDraw(riverlayout)

RiverPoint(B.elevation$Site, B.elevation$River, B.elevation$Distance,
           B.elevation$Elevation, riverlayout)

RiverPoint(B.sitenh4n$Site, B.sitenh4n$River, B.sitenh4n$Distance,
           B.sitenh4n$NH4N_Spring, riverlayout, type = "o",
           pt.col = "#5381FFFF", pt.pch = 21, pt.bg = "lightblue")

RiverPoint(B.sitenh4n$Site, B.sitenh4n$River, B.sitenh4n$Distance,
           B.sitenh4n$NH4N_Autumn, riverlayout, type = "o",
           pt.col = "#FF3931FF", pt.pch = 21, pt.bg = "pink",
           lbl.shw = TRUE)
```

RiverReach *River Reach Plotting*

Description

This highlights river reaches on the river chart.

Usage

```
RiverReach(reach, river, from, to, group, style, riverlayout, rea.pos = NA,
  rea.col = "lightblue", rea.lty = 1, rea.lwd = 1, rea.den = NULL,
  bd.col = "black", ln.shw = T, ln.col = "grey40", ln.lty = 3,
  ln.lwd = 1, pt.shw = T, pt.col = "black", pt.pch = 20,
  pt.bg = "black", pt.cex = 1, pt.lwd = 1)
```

Arguments

reach	a vector of reach names.
river	a vector of rivers to which the reaches belong.
from	a numeric vector of starting points.
to	a numeric vector of ending points.
group	a vector of reach group names. This indicates to which group the reaches belong.
style	a vector of reach styles. The value of "style" denotes the location of reach lines. Especially, 0 denotes "on axis" and 99 means "the reach is presented as a band rather than a line".

riverlayout	the output list of RiverLayout or RiverMap.
rea.pos	a vector of absolute positions of lines. The values range in [0,1].
rea.col	line colour.
rea.lty	line style.
rea.lwd	line width.
rea.den	the density of shading lines, in lines per inch. See rect.
bd.col	colour of river chart frames.
ln.shw	show lead lines (TRUE) or not (FALSE).
ln.col	lead line colour.
ln.lty	lead line style.
ln.lwd	lead line width.
pt.shw	show anchor point (TRUE) or not (FALSE). Anchor points represent the locations of the river mouths.
pt.col	anchor point colour.
pt.pch	anchor point style.
pt.bg	anchor point background(fill) colour when pch=21:25.
pt.cex	anchor point size.
pt.lwd	anchor point border width.

Author(s)

Feng Mao

See Also

RiverLayout, RiverDraw, RiverMap, par.

Examples

```
data(Ballinderry)

riverlayout <- RiverLayout(B.river$River,B.river$Length,
                           B.river$Parent,B.river$Position,
                           B.river$Distance, direction = -1)
RiverDraw(riverlayout)

RiverReach(B.reach$Reach, B.reach$River, B.reach$From,
           B.reach$To, B.reach$Group, B.reach$Style, riverlayout,
           rea.lwd = 5)

RiverReach(B.reach$Reach, B.reach$River, B.reach$From,
           B.reach$To, B.reach$Group, 2, riverlayout,
           rea.col = "darkred", rea.lwd = 5)
```

RiverScale *River Chart Scale*

Description

This plots the scale of river charts.

Usage

```
RiverScale(length, label, riverlayout, loc = NA, scl.col = "black",
  scl.lwd = 1, lbl.cex = 0.5, lbl.pos = 4, lbl.ofs = 0.5)
```

Arguments

length	the length of the scale. The length is defined in the same units as the river length. The function will convert this real length into a segment with the same scale as the rivers, and plot it on the river chart.
label	a string defining a scale label indicating the real length the scale segment represents.
riverlayout	the output list of RiverLayout or RiverMap.
loc	location of scale. One or two values in the range [0, 1] to define left and bottom margin sizes. If loc = NA, use mouse to locate the arrow. ESC to confirm.
scl.col	scale colour.
scl.lwd	scale line width.
lbl.cex	scale label size.
lbl.pos	scale label position. 1 for below, 2 for left, 3 for above, and 4 for right. See par for details.
lbl.ofs	scale label position offset.

Author(s)

Feng Mao

See Also

RiverLayout, RiverDraw, RiverMap, par, locator.

Examples

```
data(Ballinderry)

riverlayout <- RiverLayout(B.river$River,B.river$Length,
                           B.river$Parent,B.river$Position,
                           B.river$Distance, direction = -1)
RiverDraw(riverlayout)
```

```
RiverScale(2, "2 km", riverlayout, loc = c(0.8, 0.10),lbl.cex = 0.8)

# Use mouse to allocate the river scale
## RiverScale(2, "2 km", riverlayout, lbl.cex = 0.8)
```

`RiverSite` *Site of Interest*

Description

This plots sites of interest on the river chart.

Usage

```
RiverSite(site, river, distance, group, riverlayout, pt.pch = 21,
  pt.col = NA, pt.bg = "red", pt.cex = 1, lbl.cex = 0.5, lbl.srt = 0,
  lbl.adj = c(0.5, 2), lbl.col = "black", lbl.pos = 1, lbl.ofs = 0.5,
  lbl.shw = TRUE)
```

Arguments

`site`	a character vector of site names.
`river`	a vector of rivers on which the sites are located.
`distance`	a vector. The along-the-river distance between the site and the mouth of the river.
`group`	a vector. Group names of river locations.
`riverlayout`	the output list of `RiverLayout` or `RiverMap`.
`pt.pch`	point style.
`pt.col`	point border colour.
`pt.bg`	point background(fill) colour when `pt.pch=21:25`.
`pt.cex`	point size.
`lbl.cex`	label size.
`lbl.srt`	label angle.
`lbl.adj`	label adjustment. One or two values in [0,1] for x and y (optional) adjustment.
`lbl.col`	label colour.
`lbl.pos`	label position. `1` for below, `2` for left, `3` for above, and `4` for right. See `par` for details.
`lbl.ofs`	label position offset.
`lbl.shw`	show labels (`TRUE`) or not (`FALSE`).

Author(s)

Feng Mao

See Also

RiverLayout, RiverDraw, RiverMap, par.

Examples

```
data(Ballinderry)

riverlayout <- RiverLayout(B.river$River,B.river$Length,
                           B.river$Parent,B.river$Position,
                           B.river$Distance, direction = -1)
RiverDraw(riverlayout)

RiverSite(B.soi$SOI, B.soi$River, B.soi$Distance, B.soi$Group, riverlayout,
          pt.bg = c("red","green","yellow"), lbl.shw = FALSE)

RiverDraw(riverlayout)

RiverSite(B.town$Town, B.town$River, B.town$Distance, B.town$Group,
          riverlayout, pt.pch = 22, lbl.shw = FALSE,
          pt.bg = "orange", pt.col = "black")

RiverSite(B.soi$SOI, B.soi$River, B.soi$Distance, B.soi$Group,
          riverlayout, pt.pch = c(25, 24, NA),
          lbl.shw = FALSE, pt.bg = NA, pt.col = "black")
```

RiverTM *Tick Marks on River Charts*

Description

This adds tick marks to the river chart.

Usage

```
RiverTM(tickmark, value, riverlayout, range = NA, side = "L", pos = 1,
  tm.l = 1, tm.col = "black", lbl.shw = TRUE, lbl.col = "black",
  lbl.cex = 0.7, lbl.row = TRUE, label = NA)
```

Arguments

tickmark	a vector of tick mark values.
value	the variables which the tick marks are for.
riverlayout	the output list of RiverLayout or RiverMap.
range	bar-chart value range. A vector of two values indicating lower limit and upper limit.
side	position of tick marks. "l" for left and "r" for right.
pos	position of tick marks. -1 for in and 1 for out.

tm.l	tick mark length.
tm.col	tick mark colour.
lbl.shw	show labels of tick marks (TRUE) or not (FALSE).
lbl.col	label colour.
lbl.cex	label size.
lbl.row	show one label per row (TRUE) or not (FALSE).
label	a vector of tick mark labels.

Author(s)

Feng Mao

See Also

RiverLayout, RiverDraw, RiverMap. par.

Examples

```
data(Ballinderry)

riverlayout <- RiverLayout(B.river$River,B.river$Length,
                           B.river$Parent,B.river$Position,
                           B.river$Distance, direction = -1)
RiverDraw(riverlayout)

RiverPoint(NA,B.elevation$River, B.elevation$Distance,
           B.elevation$Elevation, riverlayout)

RiverTM(c(0, 100, 200, 300, 400, 500), B.elevation[3], riverlayout,
        pos=-1, side = "R", range = c(0,500),
        label = c(0, 100, 200, 300, 400, 500))
```

Index