Package 'ViSiElse'

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Type Package

Version 1.2.1

Title A Visual Tool for Behavior Analysis

Description A graphical tool designed to visualize and to give an overview of behavioral observations realized on individuals or groups. Visualization of raw data during experimental observations of the realization of a procedure. It graphically presents an overview of individuals and group actions usually acquired from timestamps during video recorded sessions. Options of the package allow adding graphical information as statistical indicators (mean, standard deviation, quantile or statistical test) but also for each action green or black zones providing visual information about the accuracy of the realized actions.

URL https://github.com/CEPOI/ViSiElse

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`ConvertFromViSibook-ViSibook-method`
Method `ConvertFromViSibook-ViSibook`

Description

The method `ConvertFromViSibook` converts a ViSibook in a data.frame object.

Usage

```
ConvertFromViSibook(x)

## S4 method for signature 'ViSibook'
ConvertFromViSibook(x)
```

Arguments

x	a ViSibook object.

Value

a data.frame.

See Also

`ViSibook` and see `plot-ViSigrid-method` for examples.

ConvertoViSibook *Function* ConvertoViSibook

Description

ConvertoViSibook convert a `data.frame` in `ViSibook` object.

Usage

```
ConvertoViSibook(x)
```

Arguments

`x`	a dataframe. `x` should contains at least the columns **vars, label, typeA, showorder, deb, fin** . Optionally other characteristics can be filled : **GZDebn, GZFin, Repetition, BZBeforeDeb, BZBeforeFin, BZAfterDeb, BZAfterFin, BZLong , BZLtype** .

Value

a ViSibook object.

See Also

See `visielse` for examples.

dim-ViSibook-method *Method* dim-ViSibook

Description

Method Dim for ViSibook object.

Usage

```
## S4 method for signature 'ViSibook'
dim(x)
```

Arguments

`x`	a ViSibook object.

Value

Vector

1. The number of actions defined in x.
2. The number of characteristics defined in x, its minimum value is 6 and its maximum is 15.

See Also

ViSibook

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initialize,ViSibook-method

Method initialize-ViSibook

Description

Method initialize for class ViSibook object.

Usage

```
## S4 method for signature 'ViSibook'
initialize(.Object, vars, label, typeA, showorder,
  deb, fin, GZDeb, GZFin, Repetition, BZBeforeDeb, BZBeforeFin, BZAfterDeb,
  BZAfterFin, BZLong, BZLtype, NAMES)
```

Arguments

.Object	a ViSibook object.
vars	a vector storing names of actions.
label	a vector. storing brief description of actions.
typeA	Vector storing type of actions, "l" for long actions, "p" for punctuals.
showorder	vector storing order in which actions will be plotted, is an actions is not to be plot its showorder is "NA".
deb	Vector storing, for long actions, the punctual action names that corresponds to its start.
fin	Vector storing, for long actions, the punctual action that corresponds to its end.
GZDeb	Vector storing punctuals actions green zone starting time.
GZFin	Vector storing punctual action green zone ending time.
Repetition	Vector storing if the green zones should be repeated the time interval of repetition.
BZBeforeDeb	Vector storing punctual black zone 1 starting time.
BZBeforeFin	Vector storing punctual black zone 1 ending time.
BZAfterDeb	Vector storing punctual black zone 2 starting time.
BZAfterFin	Vector storing punctual black zone 2 ending time.
BZLong	Vector storing the long action black zone time.
BZLtype	Vector storing the type of the black zone, "time" if the action should be finish at a time, "span" if the action should be finish in a time.
NAMES	Vector storing names of slots that are to be considered for plot-ViSigrid-method.

Value

a ViSibook object

See Also

See plot-ViSigrid-method for examples.

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plot-ViSibook-method *Method* plot-ViSibook

Description

Method plot for ViSibook object.

Usage

```
## S4 method for signature 'ViSibook'
plot(x, ncharmax = 10, ncharmaxdelay = 50)
```

Arguments

x	a ViSibook object.
ncharmax	is the number maximum of plotted character for the labels of punctual actions, set to 10.
ncharmaxdelay	number maximum of plotted character for the labels of long actions, set to 50.

See Also

ViSibook, visielse

---

plot-ViSigrid-method *Method* plot-ViSigrid

Description

Method plot for ViSigrid object. This method provides a graphic of raw data during experimental observations of the realization of a procedure like a medical algorithm. It graphically presents an overview of individuals and group actions usually acquired from timestamps during video recorded sessions.

Usage

```
## S4 method for signature 'ViSigrid'
plot(x, scal.unit.tps = 10, unit.tps = "s",
  main = " ", ncharlabel = 30, size.main = 12, Fontsize.title = 11,
  Fontsize.label.Action = 11, Fontsize.label.Time = 11,
  Fontsize.label.color = 9, col.main = "black", col.grid = "grey",
  colgreenzone = "green", colblackzone = "black", alphainf = 0.8,
  alphasup = 1, alphaZones = 0.2, vp0h = 0.6, vp0w = 0.6,
  linA = 0.7, rcircle = 15, lwdline = 2, lwd.grid = 1,
  lty.grid = 1)
```

Arguments

x	A ViSigrid object built using the visielse function.
scal.unit.tps	Unity of time for the grey grid legend.
unit.tps	Unit of time (s,min,..).
main	Title.
ncharlabel	Maximum number of plotted characters for labels of actions.
size.main	Title size.
Fontsize.title	Fontsize of the title.
Fontsize.label.Action	Fontsize of labels of plotted actions.
Fontsize.label.Time	Fontsize of the time axis.
Fontsize.label.color	Fontsize of legends.
col.main	Title color.
col.grid	Color of the legend box.
colgreenzone	Color of the green zones.
colblackzone	Color of black zones.
alphainf	Alpha of informers circles.
alphasup	Alpha of supplementary times.
alphaZones	Alpha of green and black zones.
vp0h	Height of the main plot window, <1.
vp0w	Width of the main plot window, <1.
linA	Height of the plotting area in each actions lines, < 1.
rcircle	circle radius of informers circles.
lwdline	line width of lines linking the 3 informers circles.
lwd.grid	Lines width of the legend box.
lty.grid	Lines type of the legend box.

See Also

ViSigrid, ViSibook, visielse.

print,ViSibook-method *Method* print-ViSibook

Description

Method print for ViSibook object.

Usage

```
## S4 method for signature 'ViSibook'
print(x)
```

Arguments

x	a ViSibook object.

See Also

ViSibook, visielse, and see plot-ViSigrid-method for examples.

set-ViSibook-method *Method set for ViSibook object.*

Description

Method set for ViSibook object.

Usage

```
## S4 replacement method for signature 'ViSibook,numeric,numeric,ANY'
x[i, j] <- value

## S4 replacement method for signature 'ViSibook,missing,numeric,ANY'
x[i, j] <- value

## S4 replacement method for signature 'ViSibook,numeric,missing,ANY'
x[i, j] <- value
```

Arguments

x	a ViSibook object.
i	a numeric.
j	a numeric.
value	object to allocate.

Value

a ViSibook object.

See Also

ViSibook

---

show-ViSibook-method *Method* show-ViSibook

Description

Method show for ViSibook object.

Usage

```
## S4 method for signature 'ViSibook'
show(object)
```

Arguments

object	a ViSibook .

See Also

ViSibook.

---

show-ViSigrid-method *Method* show-ViSigrid

Description

Method show for ViSigrid object.

Usage

```
## S4 method for signature 'ViSigrid'
show(object)
```

Arguments

object	a ViSigrid.

See Also

ViSigrid and see plot-ViSigrid-method for examples.

summary-ViSigrid-method *Method* summary-ViSigrid

Description

Method summary for ViSigrid object.

Usage

```
## S4 method for signature 'ViSigrid'
summary(object)
```

Arguments

object	a ViSigrid.

Value

list

- **punctuals** summary of punctual actions (typeA=="p").
- **longs** summary of long actions (typeA=="p").

See Also

ViSigrid, visielse,ViSibook. and see plot-ViSigrid-method for examples.

ViSibook-class *Class* ViSiBook

Description

Class ViSibook defines the structure of the process to be plotted.

Slots

vars a vector storing names of actions.

label a vector storing brief description of actions.

typeA a vector storing type of actions, "l" for long (which have a stating time and an ending time), "p" for punctual.

showorder a vector storing order in which actions will be plotted. When an actions is not to be plot showorder should be NA.

deb a vector.

- Long actions deb stores the punctual action names that corresponds to long actions beginning.
- Punctual action NA .

`fin` a vector.

- Long actions `fin` stores the punctual action names that corresponds to long actions ending.
- Punctual actions NA .

`GZDeb` a vector, optional, `GZdeb` stores punctual actions green zone starting time.

`GZFin` a vector, optional, `GZFin` stores punctual actions green zone ending time.

`Repetition` optional a vector, optional, When a green zone is defined, `Repetition` stores the length of the time interval between green zones.

`BZBeforeDeb` a vector, optional, `BZBeforeDeb` a vector storing punctual black zone 1 starting time.

`BZBeforeFin` a vector, optional, `BZBeforeFin` storing punctual black zone 1 ending time.

`BZAfterDeb` a vector, optional, `BZAfterDeb` stores punctual black zone 2 starting time .

`BZAfterFin` a vector, optional, `BZAfterFin` stores punctual black zone 2 ending time.

`BZLong` a vector, optional, `BZLong` stores the long action black zone time.

`BZLtype` a vector, optional, `BZLtype` stores the type of the black zone, "time" if the action should be finish at a time, "span" if the action should be finish in a time.

`NAMES` a vector storing names of slots that are to be defined.

See Also

`visielse` for examples.

`ViSibookfromDATA` *Function* `ViSibookfromDATA`

Description

`ViSibookfromDATA` build an object class ViSibook from observational data. The process is the ordered list of punctual actions given by the columns names of X.

Usage

```
ViSibookfromDATA(X, idsubject = 1)
```

Arguments

`X`	data.frame.
`idsubject`	numeric indicates the number of the column of X which stores id.

Value

a ViSibook corresponding to the dataset X.

visielse *Function* visielse

Description

visielse plots the graphic from data and build an object class ViSigrid with at least data of times of individual execution for each punctual action defined in the ViSibook.

Usage

```
visielse(X, book = NULL, is.ViSibook = FALSE, doplot = TRUE,
  Xsup = NULL, method = "global", group = NULL, grwithin = NULL,
  informer = "median", tests = TRUE, threshold.test = 0.01,
  quantity = "N", pixel = 20, t_0 = 0, sorted.line = TRUE,
  decrgr2 = FALSE, max_tps = NULL, colvect = NULL, ncolvect = NULL,
  times = FALSE, timeformat = c("hh:mm:ss"), idsubject = 1)
```

Arguments

X	A data.frame or matrix. X stores punctual action realization times. The actions are defined in book, and X columns names should correspond to the slot "vars" of book. X must also have a column to identify individuals.
book	A data.frame or a ViSibook or NULL. book stores the process structure. • If it is a data.frame it should contains at least the columns **vars, label, typeA, showorder, deb, fin** . Optionally other characteristics can be filled : **GZDebn, GZFin, Repetition, BZBeforeDeb, BZBeforeFin, BZAfterDeb, BZAfterFin, BZLong , BZLtype** . • If it is a ViSibook it should correspond to the columns names of X. • If it is NULL the process is the ordered list of punctual actions given by the columns names of X.
is.ViSibook	A logical • FALSE if book is a data.frame or NULL. • TRUE is book is a ViSibook.
doplot	A logical If FALSE the graphic is not plotted.
Xsup	A data.frame or matrix storing supplementary time data, **all individuals in** Xsup **must be in** X.
method	In { "global" , "cut" , "join" , "within" }. method specifies the plotting method, see details. If group is NULL, method is set to "global".
group	A factor with two levels. group indicates the group attributed to the individuals, it has same the length as the number of rows of X.
grwithin	A level of group. If method is set to within, grwithin specifies the group to consider.

informer	In { "NULL" , "median" , "mean" }. If informer is set to "median" the median and quartiles are computed, if it is set to "mean" the mean and standard deviation are. If informer is NULL no indicators are computed.
tests	A boolean. When informer is not NULL and group is defined, if tests is TRUE, tests are computed to compare groups. If the parameter informer is set to "mean", the function wilcox.test() is used, if informer is set to "median" the function mood.test() is used.
threshold.test	A numeric between 0 and 1. threshold.test is the value of the p-value under which the H0 hypothesis of the test is rejected when tests is TRUE.
quantity	In { "N" , "dens" }. quantity allows choosing the quantity represented for punctual action When quantity is set to "N" the number of individuals is considered. Otherwise when it is set to "dens" proportion of individuals is considered instead. If group is defined and method set to "cut" or "within", this proportion is calculated regarding each represented group.
pixel	An integer. It is the number of unit of time under which individuals are aggregated in the plot.
t_0	either 0, either a value of the slot "vars" in book, t_0 indicates the starting time to plot.
sorted.line	A boolean. When sorted.line is TRUE, it allows long actions to be sorted by starting time.
decrgr2	A boolean. When sorted.line is TRUE and decrgr2 is TRUE, long actions of the second group are plotted in decreasing order by starting times.
max_tps	A numeric, >0. max_tps is the maximum time used to build the grid in the plot. max_tps is useful when Xsup is given. If max_tps is NULL it is automatically computed.
colvect	A matrix containing colors. Colors are automatically computed if colvect is NULL. If group is not NULL colvect should have two rows otherwise one.
ncolvect	A numeric. ncolvect indicates the number of columns of colvect. Its default setting is dim(X)[1]. ncolvect is considered only if colvect is NULL.
times	A boolean. If times is TRUE, it indicates that X contains data in a time format.
timeformat	time format. If times is TRUE.
idsubject	An integer between 1 and dim(X)[2]. idsubject indicates the number of the column of X that contains individuals id numbers.

Details

- method
  - global : The plot of the ViSigrid object returned will not consider the parameter group and plot indistinctly all individuals.
  - cut : In the plot of the ViSigrid object returned each group will be plotted apart within each action line.
  - join : In the plot of the ViSigrid object returned groups will be plotted gathered within each action line.

  - `within` : In the plot of the ViSigrid object returned , within each action line, there will be two lines, as for the method `cut`, the difference is that the first line will plot all individuals and the second one individuals belonging to the group specified in `grwithin`.

- `informer`

  The parameter `informer` allows choosing an indicator. `informer` can take three values:

  - `median`: Median and quartiles are calculated for each action, using the function quantile from the package stats. This is the default value.
  - `mean`: Mean and standard deviation are calculated for each action, using the functions mean and var from the package stats.
  - `NULL`: no indicators are computed.

  When a group is declared indicators are calculated by group if the method cut or within is chosen.

  When plotting the `ViSigrid` object, indicators for a punctual action are represented by white circles linked by a line. For long action, only a black line is plotted from the median (or mean) of the punctual action staring it. The line length represents the median (or mean) of the long action duration. Informers are computed directly on the given matrix for punctual action. And for a long action it is calculated on the difference between the beginning punctual action and the ending one.

- `tests` and `threshold.test`

  As for the parameter informer, tests are computed on the given matrix or data.frame X for a punctual action. And for a long action it is calculated on its difference between its beginning and ending punctual actions. In `plot-ViSigrid-method`, results of the tests are represented by a star only when the resulted p-value is bellow or equal to the parameter threshold.test.

- `pixel`

  The parameter pixel represents the number of unit of time under which individuals are aggregated for punctual action in the plot. When the parameter pixel is too small the information represented will be too much aggregated to allow interpretation.

  For punctual actions data are aggregated in a matrix M . The number of row of M is the number of action and its number of columns is $[(max(X) - t_0)/pixel]$.

  $M_{i,j}$ contains the number of observations of the i-th punctual action (by the order of the ViSibook object) between $t_0 + (j-1)pixel$ included and $t_0 + j * pixel$ excluded.

- `t_0`

  The origin of the graphic can be set using the parameter t_0. There is two ways to define it:

  - A number: set to 0__. It can be change at convenience, but for long actions black zones will not be drawn, and for punctual actions black and green zones will not be translated.
  - The name of a punctual action: To set the origin of the graphic to the moment when the action was done for each individual. Black and green zones will not be translated as well.

x can also has the columns : GZDebn, GZFin, Repetition, BZBeforeDeb, BZBeforeFin, BZAfterDeb, BZAfterFin, BZLong , BZLtype

Value

a ViSigrid object.

See Also

Classes ViSigrid and ViSibook. The method plot for ViSigrid object plot-ViSigrid-method for examples.

Examples

```
coffee <- c(  58, 11,  5, 53, 53, 59, 24, 59, 46, 20)
fill_coffee <- c(162,  57,103,154,165,132,  74, 107, 104,  93)
fill_water <- c(  66,  92,54, 78, 74, 114, 91, 129, 71, 56)
push_B <- c( 74, 99, 62, 84, 83, 120, 95, 129, 80, 63 )
drink <- c( 472, 176, 475, 283, 265, 207, 234, 184, 490, 520)
X <- data.frame(id = seq(1,10), coffee, fill_coffee,fill_water,push_B,drink)
library(ViSiElse)
visi1 <- visielse(X)

#### Changing the pixel of time

visi1 <- visielse(X, pixel = 10)
# Plot the mean and standart deviation

visi1 <- visielse(X,informer = "mean")

#### Do not plot indicators
visi1 <- visielse(X,informer = NULL)


# Extraction of the visibook from the data

visi1 <- visielse(X,informer = NULL, doplot = FALSE)
book <- visi1@book
plot(book)

#### Changing labels

book[,2]<- c("Taking the coffee",
             "Fill the machine with coffee",
             "Fill the tank with water",
             "Push the Button",
             "Drink the coffee")
plot(book)
visi1 <- visielse(X, book=book, is.ViSibook = TRUE,informer = NULL)


#### Change the order of Actions in the process

book[,4]<- c(5,1,2,4,3)
plot(book)
visi1 <- visielse(X, book=book, is.ViSibook = TRUE)



#### Adding a long Actions
```

```
visi1 <- visielse( X )
book <- ConvertFromViSibook( visi1@book ) # Convert book into data.frame
add_delay <- c( "delay_coffee_push","Preparation","l","6","coffee","push_B")
book[6,] <- add_delay
book


### ViSiElse representation of long actions

visi2 <- visielse( X=X , book=book,informer=NULL)

## Green & Black zones

book$GZDeb <- c(NA,60,NA,NA,NA,NA)
book$GZFin <- c(NA,120,NA,NA,NA,NA)
book$BZBeforeDeb <- c(NA,0,NA,NA,NA,NA)
book$BZBeforeFin <- c(NA,30,NA,NA,NA,NA)
book$BZAfterDeb <- c(NA,180,NA,NA,NA,NA)
book$BZAfterFin <- c(NA,Inf,NA,NA,NA,NA)
book$BZLong <- c(rep(NA,5),150)
book$BZLtype <- c(rep(NA,5),"time")
visi1 <- visielse( X, book=book , informer = NULL)

book$BZLtype <- c(rep(NA,5),"span")
visi1 <- visielse( X, book=book ,informer = NULL)


## Group

### Method : Cut
group <- c( "group2","group1","group2","group1","group1",
             "group2","group1","group1","group1","group2")
visi1 <- visielse( X,group=group, book=book ,informer = NULL, method = "cut")

visi1 <- visielse( X,group=group, book=book ,informer = NULL, method = "join")

visi1 <- visielse( X,group=group, book=book ,informer = NULL, method = "within",grwithin = "group1")
```

ViSigrid-class *Class* ViSigrid

Description

Class ViSigrid defines the structure of the process to be plotted.

Slots

MATp A "dgCMatrix". It stores the grid for all punctuals actions in the book.

`MATpsup` A `"dgCMatrix"`. It stores the grid for all punctuals actions in the book corresponding to the supplementary times.

`idsup` A `"vector"` It stores individuals id having supplementary times.

`colvect` A `"matrix"` Matrix with colors to use.

`L` A `"data.frame"` It stores the data corresponding to long actions having a showorder.

`idsort` A `"matrix"` For all long actions, it stores the order of individuals in which each actions will be plot.

`BZL` A `"dgCMatrix"` It stores black zones for long actions, calculated for each individuals.

`Lsup` A `"data.frame"` for the long actions having a showorder and supplementary times defined, it stores the data corresponding to those actions.

`book` A `"ViSibook"` it stores the structure of the grid for the plot.

`group` A `"factor"` it stores the group for the each individuals.

`vect_tps` A `"vector"` it stores the times vector mapping the grid.

`informers` A `"matrix"` It stores the indicators (mean, median or NULL) by actions.

`testsP` A `"vector"` Results of tests p.value<threshold.test.

`parameters` A `"list"`. It stores the parameters put in the `visielse` function.

See Also

`visielse`, `plot,ViSigrid-method`, `ViSibook`

`[,ViSibook,numeric,missing,ANY-method`

Method get for ViSibook object.

Description

Method get for ViSibook object.

Usage

```
## S4 method for signature 'ViSibook,numeric,missing,ANY'
x[i, j, drop = TRUE]

## S4 method for signature 'ViSibook,missing,numeric,ANY'
x[i, j, drop = TRUE]

## S4 method for signature 'ViSibook,numeric,numeric,ANY'
x[i, j, drop = TRUE]
```

Arguments

x	a ViSibook object.
i	a numeric.
j	a numeric.
drop	= TRUE.

Value

obj.

See Also

ViSibook.

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