Package 'ymse'

June 11, 2019

Title Ymse (Various)

Version 0.6.4

Description Supplies a number of more or less useful functions and methods suitable for, eg. estimating dice roll probabilities, calculate latin squares, perform binary search, adjust colours in HSV space, produce prime numbers, find maximum acf/pacf/ccf, convert floats to simple ratio, produce averaged shifted histogram drop variables from formulae using regex, flatten a nested list, compute the similarity between two character vectors, plot a simple loess smooth, and other assorted tasks.

Depends R (>= 3.5.0)

Imports stats, utils, graphics, grDevices, forecast

License GPL (>= 2)

Encoding UTF-8

LazyData true

RoxygenNote 6.0.1

R topics documented:

acf_max *Maximum ACF, PACF and CCF*

Description

Find lag that maximizes correlation

Usage

```
acf_max(x, ..., plot = FALSE, show = plot, ci = 0.95, ma.ci = TRUE,
  max.type = c("pos", "neg", "abs"), most.signif = FALSE)

pacf_max(x, ..., plot = FALSE, show = plot, ci = 0.95,
  max.type = c("pos", "neg", "abs"))

ccf_max(x, y, ..., plot = FALSE, show = plot, ci = 0.95,
  max.type = c("pos", "neg", "abs"))
```

Arguments

`x, y`	univariate numeric vector or time series
`...`	further arguments passed to `acf`, `pacf`, `ccf`
`plot`	logical; return a plot
`show`	indicate on the plot the maximum correlation
`ci`	confidence interval used, by default 95%
`ma.ci`	should the confidence limits assume an MA input (`TRUE`, the default), or white noise as is default for `plot.acf`?
`max.type`	what maximum should be returned, the positive (default), negative, or absolute maximum?
`most.signif`	should the most significant correlation be returned. Only applicable if `ma.ci=TRUE`

Examples

```
x <- c(5, 5, 3, 6, 3, 6, 9, 6, 3, 1, 3, 2, 8, 9, 4, 3, 6, 6,
       6, 7, 5, 2, 5, 1, 5, 5, 0, 3, 7, 3, 6, 6, 2, 2, 6, 5)
y <- c(8, 9, 7, 5, 3, 5, 6, 9, 6, 3, 4, 5, 9, 7, 8, 5, 5, 7,
       4, 7, 7, 2, 5, 6, 5, 7, 5, 3, 5, 6, 7, 0, 5, 3, 8, 4)

acf_max(x, plot=TRUE, max.type="abs")
acf_max(x, max.type="neg")
acf_max(x, max.type="neg", most.signif=TRUE)

pacf_max(x, plot=TRUE)
pacf_max(x, max.type="abs")

ccf_max(x, y, plot=TRUE)
ccf_max(x, y, max.type="neg")

# Same plot
plot(acf(x, plot=FALSE), ci.type="ma")
```

```
acf_max(x, plot=TRUE)


acf_max(x, ci=0.99, plot=TRUE)
ccf_max(x, y, ci=0, max.type="pos", plot=TRUE)
```

---

addrows *Add rows to a data.frame*

Description

An "rbind for data.frames", sort of.

Usage

```
addrows(dtf, nrw, top = FALSE)
```

Arguments

dtf	data.frame; original data.frame
nrw	data.frame; the new row(s) to be added
top	logical; should the new rows be added to the top or the bottom (default)?

Details

Can only bind two objects at a time, but will bind data.frames with non-matching column names and -classes. In such cases the original data.frame will serve as template.

Examples

```
dtf <- data.frame(A=letters[1:5],
                  B=1:5,
                  C=as.factor(5:1),
                  D=as.Date(0:4, origin="2000-01-01"),
                  stringsAsFactors=FALSE)

nrw <- data.frame(A=letters[1:5],
                  B=4:8,
                  C=5:1,
                  D=as.Date(5:1, origin="1990-01-01"),
                  stringsAsFactors=FALSE)
str(dtf)

dtf.a <- addrows(dtf, nrw, top=FALSE)
str(dtf.a)

# adding a single row with little concern for data types and column names
b <- type.convert(beaver1[80:90,])
b$activ <- as.logical(b$activ)

addrows(b, data.frame(350, 1200, 37.02, 1))
```

`adjustcolorHSV` *Adjust Colors in One or More Directions Conveniently.*

Description

Adjust or modify a vector of colors by "turning knobs" on one or more coordinates in (h,s,v,α) space, typically by up or down scaling them.

Usage

```
adjustcolorHSV(col, alpha.f = 1, h.f = 1, s.f = 1, v.f = 1,
  offset = c(0, 0, 0, 0), transform = diag(c(h.f, s.f, v.f, alpha.f)),
  h = NULL, s = NULL, v = NULL, alpha = NULL)
```

Arguments

`col`	vector of colors, in any format that col2rgb() accepts
`alpha.f, h.f, s.f, v.f`	factors scaling the opacity, hue, saturation and value of `col`
`offset`	a length 4 numeric vector specifying the linear offset applied to the *hue*, *saturation*, *value* and *alpha* values
`transform`	a 4x4 diagonal matrix specifying the scaling applied to the *hue*, *saturation*, *value* and *alpha* values
`h, s, v, alpha`	fixed vlues for hue, saturation, value and alpha. Overrides any corresponding scaling factor or offset

Details

Essentially an HSV version of the RGB-based `adjustcolor`. One important distinction is that the `h.f` value wraps around to fit the [0, 1] range, rather than simply "clamping" it between 0 and 1.

Value

A character vector the same length as `col` contaning color data in standard hexadeximal RGBA format.

Examples

```
# Halve the saturation and value of the default palette colours
plot(2:8, cex=5, lwd=4, pch=21, bg=2:8,
  col=adjustcolorHSV(2:8, s.f=0.5, v.f=0.6))

# Offset the hue of the default palette colours by 0.5, inverting the colours
plot(2:8, cex=5, lwd=4, pch=21, bg=2:8,
  col=adjustcolorHSV(2:8, offset=c(0.5, 0, 0, 0)))
```

ahist *Average shifted histogram*

Description

Create a smoothed histogram by averaging several histograms shifted by fractions of a bin-width

Usage

```
ahist(x, n.breaks = nclass.FD(x), n.shifts = 3, type = c("histogram",
  "polygon", "line", "table"), freq = FALSE, plot = TRUE, add = FALSE,
  ...)
```

Arguments

`x`	a vector of values for which the histogram is desired
`n.breaks`	an integer giving the number of bins to be used
`n.shifts`	an integer giving the number of shifts to be performed
`type`	if `plot=TRUE`, the type of plot to be used
`freq`	should frequency counts be used, or density (default)
`plot`	logical; if `TRUE` (default), a graphical output will be returned
`add`	logical; if `TRUE` the plot will be added to the current plot
`...`	further graphical parameters to `ymse::plot.histogram`, `polygon`, or `lines`

Value

an object of class "`histogram`"

Examples

```
set.seed(1)
n <- 6

x <- sample(sample(0:20, 8), 6*n, replace=TRUE) + rnorm(6*n, -8, 0.5)
x <- c(x, rgamma(5*n, 3, 0.5), rnorm(4*n, 15, 2))
x <- round(x*5)/5

hist(x, freq=FALSE, breaks="FD", col="lightblue")
ahist(x, type="hist", border=2, col=7, freq=FALSE, lwd=2)
ahist(x, type="poly", border=2, col=7, freq=FALSE, lwd=2)
ahist(x, type="line", col=2, freq=FALSE, lwd=2)
ahist(x, type="table", col=2, freq=FALSE, lwd=2)
ahist(x, plot=FALSE)
```

arfilter — *AR filter*

Description

Filter a time series using AR coefficients

Usage

```
arfilter(x, mod, x.mean = mod$x.mean, init = "focb")
```

Arguments

x	a time series
mod	an AR model
x.mean	the mean used. By default the mean of the original model. Set to zero for no demeaning
init	how the initial values should be chosen. First observation carried backwards (default), mean of the first values, or the first values in reverse.

See Also

armodel

Examples

```
set.seed(1)
arap <- ar(AirPassengers)
spec.ar(arap)
spec.pgram(arfilter(rnorm(10000), arap), span=21, na.action=na.omit)

arm <- armodel(c(1.3, -0.4))
spec.ar(arm)
plot(x <- rnorm(200), type="l")
lines(scale(arfilter(x, arm), center=FALSE), col="red", lwd=2)
```

arfit — *AR model fit*

Description

Fit a specified AR model to a univariate time series

Usage

```
arfit(x, mod, x.mean = mod$x.mean)
```

Arguments

x	a time series
mod	an AR model
x.mean	the mean used. By default the mean of the original model. Set to zero for no demeaning

See Also

armodel for examples

Examples

```
set.seed(1)
x <- runif(50) + sin(1:50/10)
plot(x); lines(arfilter(x, armodel(c(1.5, -0.5, 0.5)), x.mean=mean(x)))
```

---

arimpulse *Impulse response of an AR model*

Description

Get and plot the impulse response of an AR model

Usage

```
arimpulse(mod, pulse = 1, n.ahead = 20, plot = TRUE, ...)
```

Arguments

mod	an AR model
pulse	numeric vector; the initial pulse. Magnitude is added to the model mean
n.ahead	the length of the computed response
plot	logical; sgould the result be plotted?
...	further arguments to plot

See Also

armodel for examples

`armodel` *Create an AR model object*

Description

Specify the characteristics of an AR model

Usage

```
armodel(coefs, mean = 0, intercept = 0, var.pred = 1, frequency = 1,
  x.name = "Synthetic AR model")
```

Arguments

`coefs`	a vector of model coefficients
`mean`	the mean of the process
`intercept`	the intercept in the model
`var.pred`	the portion of the variance not explained by this model
`frequency`	the sampling frequency of the process
`x.name`	name of the series

See Also

`arimpulse`

Examples

```
# short decay
ar.mod <- armodel(c(0.5))
arimpulse(ar.mod, pulse=1)

# long decay
ar.mod <- armodel(c(0.8))
arimpulse(ar.mod, pulse=1)

# negative second coefficient reduce damping, signal returns to normal
# more quickly
ar.mod <- armodel(c(0.8, -0.1))
arimpulse(ar.mod, pulse=1)

# second coefficient reduce damping too much, overdamping, oscillations
ar.mod <- armodel(c(0.8, -0.5))
arimp <- arimpulse(ar.mod, pulse=1, n.ahead=40)$pred
polyroot(c(1, -ar.mod$ar)) # complex conjugate roots
acf(arimp) # period ~= 6?
phi1 <- ar.mod$ar[1]
phi2 <- ar.mod$ar[2]
f <- (1/(2*pi)) * acos((phi1*(phi2-1))/(4*phi2))
1/f # period = 6.78
sp <- spec.ar(ar.mod, plot=FALSE)
1/sp$freq[which.max(sp$spec)] # period = 6.79
```

```
# decaying oscillations
ar.mod1 <- armodel(c(0.8, -0.6, -0.5, 0.2, -0.2))
arimpulse(ar.mod1, n.ahead=100)
Mod(1/polyroot(c(1, -ar.mod1$ar))) # barely inside the unit circle

# growing oscillations
ar.mod2 <- armodel(c(0.8, -0.7, -0.5, 0.2, -0.2))
arimpulse(ar.mod2, n.ahead=100)
Mod(1/polyroot(c(1, -ar.mod2$ar))) # barely outside the unit circle

ar.mod3 <- armodel(c(1.8, -1.1, 0.2, -0.2, 0.2))
arimpulse(ar.mod3, n.ahead=100)
spec.ar(ar.mod3)

resid(arfit(rnorm(10), armodel(c(0.5, -0.1), frequency=2)))
```

`as.array.list` *Coerce a list to an array*

Description

Coerce a list consisting of data.frames or matrices of equal size to a 3d array

Usage

```
## S3 method for class 'list'
as.array(x, ...)
```

Arguments

`x`	a list of equal sized data.frames or matrices
`...`	(not used)

Value

A list of length l with elements of m rows and n columns wix result in an $m \times n \times l$ array.

Examples

```
df1 <- data.frame(x=c(1, 2, 3), y=c(2, 3, 4), z=c(3, 4, 5))
df2 <- data.frame(x=c(4, 2, 3), y=c(2, 5, 4), z=c(3, 4, 6))
df3 <- data.frame(x=c(1, 4, 2), y=c(3, 3, 8), z=c(4, 3, 5))

l <- list(df1, df2, df3)

as.array(l)

llm <- list(matrix(LETTERS[1:6], 2),
            matrix(LETTERS[7:12], 2))

as.array(llm)

as.array(speedskate)
```

bartlett *Maurice Stevenson Bartlett's car data*

Description

This is an example data set Bartlett used for a lecture course on stochastic processes, Statistics Department, University College, London. The data represents the times, in seconds, when cars passed an observation point by a road.

Bartlett attributes the data to a Dr A. J. Miller who supplied them as a class example. According to Adery C. A. Hope the data was recorded on a rural Swedish road.

Usage

```
bartlett
```

Format

A numeric vector representing time points in seconds

M. S. Bartlett's notes

Analyse the above data with a view to examining:

i whether the times of passing constitute a Poisson process;

ii if not, whether some form of "bunching" or "clustering" seems to be present.

Possible analyses include:

a testing the homogeneity of the consecutive random time-intervals, by means of a partitioning of the degrees of freedom for the total (approximate) χ^2;

b testing the homogeneity of counts in consecutive fixed time-intervals, choosing an appropriate interval, and partitioning the degrees of freedom corresponding to the total dispersion by means of an analysis of variance;

c testing the correlation between the consecutive random time-intervals;

d examining the overall distribution of counts in fixed time-intervals;

e examining the overall distribution of the consecutive random time-intervals

You should undertake at least sufficient of these to answer the questions asked.

Source

The Spectral Analysis of Point Processes (p. 280), M. S. Bartlett, 1963

Also mentioned in:
Statistical Estimation of Density Functions (p. 252), M. S. Bartlett, 1963
A Simplified Monte Carlo Significance Test Procedure (p. 583), Adery C. A. Hope, 1968

Examples

```
cpgram(diff(bartlett))

bartlett2 <- bartlett - bartlett[1]

x <- rep(0, tail(bartlett2, 1)*10)
x[bartlett2*10] <- 1

par(mfrow=c(2, 1), mar=c(2, 3, 1, 1))
plot(x, type="l", ann=FALSE)
lines(cumsum(x)/sum(x), col="red", lwd=2)

sp <- spectrum(x, main="", xlim=c(0, 0.1), ylim=c(1e-3, 0.04))
spec <- predict(loess(sp$spec[1:3000] ~ sp$freq[1:3000], span=0.15), se=TRUE)
lines(sp$freq[1:3000], spec$fit, col="red", lwd=2)
lines(sp$freq[1:3000], spec$fit - qt((0.99 + 1)/2, spec$df)*spec$se,
  lty=1, col="lightblue")
lines(sp$freq[1:3000], spec$fit + qt((0.99 + 1)/2, spec$df)*spec$se,
  lty=1, col="lightblue")
```

---

binsearch *Binary search*

Description

Find the position of a given value in a sorted array

Usage

```
binsearch(val, arr, L = 1L, H = length(arr))

binclosest(val, arr, L = 1L, H = length(arr))
```

Arguments

`val`	the value to search for
`arr`	a sorted array to make the search in
`L`	a lower bound
`H`	an upper bound

Details

While both `val` and `arr` can be either integer or double, the algorithm is limited by integer storage in how long the array can be. `L` and `H` can be used to limit the range of indices to be search within. `binsearch` will return either the index of the exact match, or the index just below if no exact match is found. This means that if `val` is less than the lowest value in `arr` (and `L=1`), a `0` will be returned, which can lead to issues as such an index does not exist in R. An array indexed by `0` will return a zero length object. `binclosest` will return the index of the closest match, and therefore a `1` in the situation where `binsearch` returns a `0`. If there is a tie the lower index will be returned.
In either case, if there are duplicate matches, the lower index will be returned.

Value

A single integer representing an index on the input array.

Examples

```
binsearch(15, (1:9)*3.333)
binsearch(2, (1:9)*3.333)
binclosest(2, (1:9)*3.333)

binsearch(18, seq_len(2e9))
## Not run:
binsearch(18, seq_len(3e9))
## End(Not run)
binsearch(18, seq_len(3e9), H=2e9)
binsearch(2000, seq_len(3e7)*100 + 0.1)

set.seed(1)
x <- sort(sample(1:300, 30))
r <- sort(sample(1:300, 30))

plot(sapply(r, binsearch, x), type="l")
lines(sapply(r, binclosest, x), col="red")

x <- c(1, 2, 3, 5, 8, 9)
binclosest(6, x)
binclosest(7, x)
binclosest(5, x)
```

---

bix *Bix attributes*

Description

`bix` provides access to the bix attribute of a variable. The first form returns the value of the levels of its argument and the second sets the attribute.

Usage

```
bix(d)

bix(d) <- value
```

Arguments

`d`	a `"dice"` object
`value`	value to begin index at

Examples

```
d <- dice(6)
d
bix(d)
bix(d) <- 3
```

```
d
expand(d)
```

caleidoscope *Caleidoscopic effect on a matrix*

Description

Flip a matrix vertically and horizontally before recombining into a new large matrix

Usage

```
caleidoscope(m, odd = TRUE)
```

Arguments

`m`	a matrix
`odd`	logical; should the resulting matrix have odd dimensions?

Details

Three copies of `m` will be made. One flipped horizontally, one flipped vertically, and one flipped both horizontally and vertically. Then they are recombined with the original matrix in the upper right corner, and the flipped copies in the upper left, lower righ and lower left corners, respectively.

Value

A matrix of either $2\times$ or 2×-1 the number of rows and columns of the input matrix.

Examples

```
caleidoscope(matrix(1:4, 2), odd=FALSE)

image(caleidoscope(1:9 %o% 1:9))

image(caleidoscope(matrix(runif(180*200)^2, 180)), col=rainbow(256, start=0.58))
```

central.tendency *Central tendency measures*

Description

Central tendency measures

Usage

```
pseudomedian(x, na.rm = TRUE)

cmode(x, single = TRUE, ...)

dmode(x, single = TRUE, na.rm = FALSE)

midrange(x, na.rm = FALSE)

srmean(x, na.rm = FALSE)
```

Arguments

`x`	numeric vector
`na.rm`	remove `NA`s before starting calculations
`single`	return a single value (for `cmode` and `dmode`)
`...`	send further arguments to underlying function, e.g. `density` for `cmode`

See Also

`means`

Examples

```
xx <- c(1, 3, 4, 5, 7, 8, 9, 9, 7, 5, 4, 5, 3, 8)
median(xx)
pseudomedian(xx)

# Discrete mode
dmode(c(2, 3, 3, 4, 5))
dmode(c(2, 3, 3, 2, 5))
dmode(c(2, 3, 3, 2, 5), single=FALSE)
dmode(c(2, 1, 3, NA, 1))
dmode(c(2, 1, 3, NA, NA))

# Continuous mode
cmode(c(2, 3, 3, 4, 5))
cmode(c(2, 3, 3, 4, 5))
cmode(c(2, 3, 3, 4, 4, 5), n=512)
cmode(c(2, 2, 3, 3, 6, 6, 6, 7), single=FALSE, adjust=0.5)

# Slightly robust mean
set.seed(1)
r <- round(rexp(12)*c(-100, 100))
mean(r)
srmean(r)
weighted.mean(sort(r), c(0.5, rep(1, length(r)-2), 0.5))
```

`combodice` *Combine dice*

Description

Generate probability density functions for combinations of dice.

Usage

```
combodice(x, FUN, ..., method = c("outer", "expand.grid", "convolve"), name)
```

Arguments

`x`	a list of dice objects, or objects that can be interpreted as such
`FUN`	function passed on to `outer` or `apply`, depending on method
`...`	further arguments passed to `FUN`
`method`	method for computation. One of outer, expand.grid or convolve
`name`	name used for the resulting PDF. Will use x object if none is given

Details

Each of the methods have their advantages and disadvantages. Outer and expand.grid work with roughly the same speed and memory, and can take the same kind of input, but FUN is interpreted differently, reflecting their use of `outer` and `apply` respectively. Convolve is much quicker than the other two, but is restricted to only summing distributions. While the first two can handle non-integer values, but only integer probabilities, the third can handle non-integer probabilities, but only integer values.

Value

A table giving the relative probability of each value

See Also

dusd

Examples

```
# Fudge dice
dF.2 <- as.table(c("-1"=2, "0"=2, "1"=2))
dF.1 <- as.table(c("-1"=1, "0"=4, "1"=1))
fudgedice2221 <- list(dF.2, dF.2, dF.2, dF.1)

combodice(fudgedice2221)

# Heterogeneous-class list and non-integer values
die1 <- as.table(c("2.6"=2, "3"=1, "5"=1))
die2 <- c(0, 1.4)
die3 <- as.dice(as.table(c("1"=2, "2"=2, "3"=2)))
diel <- list(die1, die2, die3)

combodice(diel)
```

```
# Regular d6 pair
re <- combodice(list(1:6, 1:6))

# Sichermann pair
si <- combodice(list(c(1, 2, 2, 3, 3, 4), c(1, 3, 4, 5, 6, 8)))
re; si # Identical

# One regular and one "average" d6
combodice(list(1:6, c(2, 3, 3, 4, 4, 5)))

# One 1/2 coin, one D4 and one d6, multiplied together
combodice(list(1:2, 1:4, 1:6), "*")

# 3d6, and d6+d10+d20. Discard lowest
discard_lowest <- function(x) sum(sort(x)[-1])
combodice(list(1:6, 1:6, 1:6), discard_lowest, method="ex")
combodice(list(1:6, 1:10, 1:20), discard_lowest, method="ex")

# Dice pool. 3 d10 with target value 7
f <- function(x) sum(x >= 7)
combodice(lapply(rep(1, 3), seq, 10), f, method="ex")/10

# Equivalent using binomial PDF
dbinom(0:3, 3, 0.4)*100

# I have a d20 with a slight bump at the 4 and 10 facets,
# which makes 16 and 11 less likely, but the nearby 3, 18, 19 and 20
# correspondingly more likely. How does this affect the PDF?
d20l <- dice(20)
d20l[c(16, 11)] <- 0.6
d20l[c(3, 20, 18, 19)] <- 1.2
mean(d20l)

c0 <- combodice(list(dice(6), dice(10), dice(20)), method="conv", name="fair")
cl <- combodice(list(dice(6), dice(10), d20l), method="conv", name="uneven")

set_mar()
plot(c0, type="o", pch=16, col="grey")
points(cl, col=2, type="o", lwd=1, pch=16, cex=0.6)
legend("topright", c("fair", "bumpy"), bty="n", col=c("grey", "red"), lwd=2:1)
```

---

compare_forecasts *Compare forecast accuracies*

Description

Test the efficacy of time series models by comparing forecasts with actual data

Usage

```
compare_forecasts(m, y = NULL, holdout = NULL)
```

Arguments

m	a list of models to compare
y	a monovariate time series; the data to train and test the models on
holdout	single integer; the last n points will be forecasted

Examples

```
data(tf.d12)
ts2 <- head(tf.d12, 110)

mod1 <- forecast::snaive(ts2)
mod2 <- ar(ts2)
mod3 <- forecast::ets(ts2)
mod.l <- list(mod1, mod2, mod3)

(l <- compare_forecasts(mod.l, ts2, 12))

par(mfrow=c(3, 1), mar=c(3, 3, 2, 1), mgp=c(2, 0.6, 0), oma=c(0, 0, 0, 0))
invisible(lapply(l, function(x) {
  plot(x$fcast.obj, shaded=FALSE, PI=FALSE, include=48, type="l",
    cex.main=0.9, xpd=NA)
  lines(x$test, col="#00FF4488")
  }
))

## Not run:
library(forecast)
data(sunspot.month)
extr <- aggregate(sunspot.month, nfrequency=2, mean)[100:349]
extr <- ts(extr, f=21)

mod1 <- StructTS(extr)
mod2 <- ar(extr)
mod3 <- nnetar(extr)
mod4 <- arfima(extr)
mod5 <- Arima(extr, order=c(3, 0, 1))
mod6 <- Arima(extr, order=c(2, 0, 2), seasonal=c(2, 1, 0))

mod.l <- list(mod1, mod2, mod3, mod4, mod5, mod6)

l <- compare_forecasts(mod.l, extr, 21)

diffs <- sapply(l, function(y) y[["fcast"]] - y[["test"]])
matplot(diffs, type="l",
  col=c("red", "lightgreen", "blue", "orange", "pink", "cyan"), lty=1)

par(mfrow=c(3, 2), mar=c(3, 3, 2, 1), mgp=c(2, 0.6, 0), oma=c(0, 0, 0, 0))
invisible(lapply(l, function(x) {
  plot(x$fcast.obj, shaded=FALSE, PI=FALSE, include=66, type="l",
    cex.main=0.9, xpd=NA)
  lines(x$test, col="#00FF4488")
  }
))
summary(l)
head(forecasts(l))
l
```

```
## End(Not run)
```

`comparison_with_ties` *Comparison with ties*

Description

Compare numeric values, returning an inbetween value for ties

Usage

```
x %tgt% y

tgt(x, y, bias = 0.5)

x %tlt% y

tlt(x, y, bias = 0.5)
```

Arguments

`x, y`	numeric values to be compared
`bias`	what bias should be given to ties? 0.5, the default, is considered neutral as it's halfway between 1 and 0 (true and false).

See Also

`Comparison`, `tied_triple_test`

Examples

```
1:5 %tlt% 3
1:5 %tgt% 3

c(1, 4, 3, 1) %tlt% c(1, 3, 3, 2)
c(1, 4, 3, 1) %tgt% c(1, 3, 3, 2)

# Calculate MannWhitney U statistic
set.seed(1)
x <- sort(round(runif(20)*13, 1))
y <- sort(round(runif(15)*10, 1))
o <- outer(x, y, "%tgt%")

sum(o)
wilcox.test(x, y, exact=FALSE)$statistic
```

default_par — *Default par*

Description

Sets `par` settings to their default values

Usage

```
default_par()
```

Details

Default par settings can be retreived by `data(.def.par)`. A new default can be specified by editing `def.par` or making a `def.par <- par(no.readonly=TRUE)` type call.

See Also

Other par_and_plot_margins_functions: `revert_par`, `set_mar`

dice — *Create, modify or convert from/to dice objects*

Description

Create, modify or convert from/to dice objects

Usage

```
dice(dval)

is.dice(x, ...)

as.dice(x, ...)

## S3 method for class 'dice'
print(x, ...)

## S3 method for class 'dice'
as.table(x, ...)
```

Arguments

`dval`	an integer vector
`x`	an arbitrary R object
`...`	further arguments passed to methods

See Also

`expand`, `table`

Examples

```
# Regular d6 dice
dice(6)

# d4 dice with sides 0, 1, 2, 4
dice(c(0:3))

# d4 dice with two 2s and two 5s
dice(c(2, 2, 5, 5))
```

---

dput2 *Write an Object to console*

Description

Writes an ASCII text representation of an R object to the console for easy copy/paste sharing

Usage

```
dput2(x, width = 65, assign = c("front", "end", "none"),
  breakAtParen = FALSE, compact = TRUE, exdent = NULL)
```

Arguments

`x`	an object
`width`	integer; column width
`assign`	character; should assignment be included?
`breakAtParen`	logical; should lines break at parenthesis begins
`compact`	remove spaces around ' = ' assignments
`exdent`	a non-negative integer specifying the exdentation of lines after the first. default 2 if assign="front", else 0.

Details

This is similar to the way `dput` is used to print ASCII representations of objects to the console. The differences are that `dput2` lets you specify the width of the resulting column, and assignment of the object to the name used in the call will by default be included. Line breaks are by default only done on whitespace, but can be set to happen at parenthesis begins as well. This should not break code and can make for a more compact representation, but it can also make the code harder to read.

See Also

`dput`, `deparse`

Examples

```
xmpl <- faithful[sort(sample(1:nrow(faithful), 50)), ]
dput(xmpl)
cat(deparse(xmpl, width.cutoff=65), sep='\n')
dput2(xmpl, compact=FALSE)
dput2(xmpl)
dput2(xmpl, assign="end")
dput2(xmpl, assign="none")
dput2(xmpl, 80)

# no line breaks on whitespaces or parens within character strings
xmpl <- mtcars[1:5, ]
rownames(xmpl) <- c("bbbb (hhhhhhh\u00A0hhhhhhhh)",
                    " rrrrrrrr ( bbbbbbb )",
                    "v v v v v v v v v v",
                    "(  g-god, d-god, _-___)",
                    "100*(part)/(total)")
dput2(xmpl, 15)
dput2(xmpl, 15, breakAtParen=TRUE)
```

`drop_pattern` *Drop predictors*

Description

Drop predictor variables according to a (regex) pattern

Usage

```
drop_pattern(form, pattern, ...)
```

Arguments

`form`	a formula object
`pattern`	predictors matching this pattern will be dropped
`...`	further arguments passed on to `grepl`

Details

`form` is divided into its individual terms, any term matching `pattern` is removed, before `form` is updated and returned. In case no match is made, `form` is returned unmodified. In case all predictors match, only the intercept is retained. In any case the response variable(s) are kept as is.

Value

A formula object

See Also

`drop_randfx`

Examples

```
f6 <- y ~ aa*bb + aa + ac + cc + acab

drop_pattern(f6, "a") # Drop all containing a
drop_pattern(f6, "a{2}") # Drop all containing exactly 2 consecutive as
drop_pattern(f6, "^[^a]*a[^a]*$")  # All containing exactly 1 a
drop_pattern(f6, ":") # Drop interaction
drop_pattern(f6, "^[^:]*a[^:]*$") # Drop all containg a, but not interaction
drop_pattern(f6, "^((?!a).)*$", perl=TRUE) # Drop all not containing a

# Degenerate cases
drop_pattern(f6, "[abc]") # Drop all
drop_pattern(f6, "q") # Drop none
```

`drop_randfx` *Drop random effects*

Description

Drop random effects from a mixed effects model formula

Usage

```
drop_randfx(form)
```

Arguments

`form`	a formula object

Details

`form` is divided into its individual terms, any term containg a vertical bar (`|`) is removed, before `form` is updated and returned. In case `form` has no random effect terms, `form` is returned unmodified. In case all effects are random, only the intercept is retained. In any case the response variable(s) are kept as is.

Value

A formula object

See Also

`drop_pattern`

Examples

```
f1 <- Reaction ~ (1 + Days | Subject)
f2 <- Reaction ~ (1 | mygrp/mysubgrp) + (1 | Subject)
f3 <- Reaction ~ x1 + x2 + (1 + Days | Subject)
f4 <- Reaction ~ x1 * x2 + (1 | mygrp/mysubgrp) + (1 | Subject)
f5 <- Reaction ~ x1 + x2
```

```
sapply(list(f1, f2, f3, f4, f5), drop_randfx)
```

`dtf_clean` *Data cleanup*

Description

Create a data.frame from a messy table

Usage

```
dtf_clean(x, header = TRUE, na.strings = c("NA", "N/A"),
  stringsAsFactors = FALSE, ...)
```

Arguments

`x`	a messy table the form of a character string
`header`	does the table include headers? (default TRUE)
`na.strings`	a vector of character strings which will be interpreted as missing values
`stringsAsFactors`	should strings be read as factors? (default FALSE)
`...`	further arguments passed to `read.table`

Examples

```
## Not run:
x1 <- "
+------------+------+------+----------+--------------------------+
|    Date    | Emp1 | Case | Priority | PriorityCountinLast7days |
+------------+------+------+----------+--------------------------+
| 2018-06-01 | A    | A1   |        0 |                        0 |
| 2018-06-03 | A    | A2   |        0 |                        1 |
| 2018-06-02 | B    | B2   |        0 |                        2 |
| 2018-06-03 | B    | B3   |        0 |                        3 |
+------------+------+------+----------+--------------------------+
"

x2 <- '
------------------------------------------------------------------
|    Date    | Emp1 | Case  | Priority | PriorityCountinLast7days |
------------------------------------------------------------------
| 2018-06-01 | A    | "A 1" |        0 |                        0 |
| 2018-06-03 | A    | "A 2" |        0 |                        1 |
| 2018-06-02 | B    | "B 2" |        0 |                        2 |
| 2018-06-03 | B    | "B 3" |        0 |                        3 |
------------------------------------------------------------------
'

x3 <- "

    Date    | Emp1 | Case | Priority | PriorityCountinLast7days
```

```
 2018-06-01 | A    | A|1  |        0 |                         0
 2018-06-03 | A    | A|2  |        0 |                         1
 2018-06-02 | B    | B|2  |        0 |                         2
 2018-06-03 | B    | B|3  |        0 |                         3

"

x4 <- "
 Maths | English | Science | History | Class

  0.1  |  0.2    |  0.3    |  0.2    |  Y2

  0.9  |  0.5    |  0.7    |  0.4    |  Y1

  0.2  |  0.4    |  0.6    |  0.2    |  Y2

  0.9  |  0.5    |  0.2    |  0.7    |  Y1
"

x5 <- "
      Season   |   Team  | W | AHWO
-------------------------------------
1  |  2017/2018 |  TeamA  | 2 | 1.75
2  |  2017/2018 |  TeamB  | 1 | 1.85
3  |  2017/2018 |  TeamC  | 1 | 1.70
4  |  2017/2018 |  TeamD  | 0 | 3.10
5  |  2016/2017 |  TeamA  | 1 | 1.49
6  |  2016/2017 |  TeamB  | 3 | 1.51
7  |  2016/2017 |  TeamC  | 2 | 1.90
8  |  2016/2017 |  TeamD  | 0 | N/A
"

lapply(c(x1, x2, x3, x4), dtf_clean)

## End(Not run)
```

---

dusd *Discrete (Uniform) Sum Distributions*

Description

Generate distributions of the sum of discrete (uniform) random variables. Two different approaches.

Usage

```
dusd1(xr = 1:6, n = 2, FUN = "+")

dusd2(xi = rep(1, 6), n = 2, bix = 1, round, limit = 1e-13)
```

Arguments

`xr`	numeric vector; a vector of equiprobable values
`n`	integer; the number of distributions to be summed

FUN	function passed on to outer
xi	numeric vector; a vector of probabilities, with indices representing values
bix	logical; where does the index of xi start?
round	integer; number of digits to round to after each convolution
limit	numeric; values (frequencies or counts) less than this will be omitted.

Details

dusd1 works by recursively taking the outer sum of xr, while dusd2 recursively convolves xi. Although convolution is more efficient, it can introduce small errors, and with repeated convolutions those errors can compound. By rounding to a slightly lower precision after each convolution the generation of spurious singletons and general imprecicions can be mitigated.

Value

dusd1 returns an array of size length(xr)^n representing every possible outcome. dusd2 returns a probability mass function in the form of a table.

See Also

combodice for a more flexible implementation of the same ideas

Examples

```
# five coin flips
plot(table(dusd1(0:1, 5)))
plot(dusd2(c(1, 1), 5, bix=0))
plot(as.table(dbinom(0:5, 5, 0.5)))

# ten flips with a loaded coin
plot(table(dusd1(c(1, 1, 2), 10)))
plot(dusd2(c(2, 1), 10))
plot(dbinom(0:10, 10, 1/3), type="h", lwd=2)

# sample from a multi-roll d4 distribution
sample(dusd1(1:4, 5), 20, replace=TRUE)
plot(ecdf(dusd1(1:4, 5)))

tt <- dusd2(xi=rep(1, 4), n=3)
plot(tt)
tt <- tt/sum(tt)
rr <- replicate(50000, sample(names(tt), prob=tt))
barplot(apply(rr, 1, table), beside=TRUE)

# distribution of the sum of three d6 rolls
plot(table(dusd1(xr=1:6, 3)))
plot(dusd2(xi=rep(1, 6), n=3))

# d6 die with faces 2, 3, 5, 7, 11, 13 (prime numbers)
plot(table(dusd1(xr=c(2, 3, 5, 7, 11, 13), 3)))

# Probalility of getting 7 or 8 with an 8-sided die in n out of 5 throws
l <- 6/8
h <- 1-l
d <- as.dice(c(l, h), bix=0)
```

```
dusd2(d, 5)
# need integer "probabilities" for dusd1
table(dusd1(d*4, 5))/(4^5)
# or an equivalent die
table(dusd1(c(0, 0, 0, 1), 5))/(4^5)

# Loaded die
p <- c(0.5, 1, 1, 1, 1, 1.5); sum(p)
plot(dusd2(xi=p, n=2))

# A loaded die with prime number faces
s <- vector(length=13)
s[c(2, 3, 5, 7, 11, 13)] <- c(0.5, 1, 1, 1, 1, 1.5)
plot(dusd2(xi=s, n=3))

# tricky to do with dusd2
plot(table(dusd1(xr=c(0.1105, 2, exp(1)), 10)))

# Demonstrating CLT
# dusd1 struggles with many iterations
# remember it returns an array of size length(xr)^n
plot(table(dusd1(xr=c(1, 2, 9), 12)))

s <- vector(length=9)
s[c(1, 2, 9)] <- 1
plot(dusd2(xi=s, 12, round=9)) # much quicker
plot(dusd2(xi=s/sum(s), 12)) # for frequencies instead of counts

# Impossible with dusd1
clt <- dusd2(xi=s, 15, round=9)
plot(clt, lwd=0.5, col="#00000088")

# small floating-point errors from convolution.
tail(dusd2(xi=s, 15))

# dusd2 isn't always quicker
## Not run:
plot(table(dusd1(xr=c(1, 220, 3779), 12)), lwd=1)
s2 <- vector(length=3779)
s2[c(1, 220, 3779)] <- 1
plot(dusd2(xi=s2, 12, round=8), lwd=1)

# making sure the length of xi is highly composite (or more precicely 'smooth')
# improves speed
# 3779 is prime, 3780 == 2*2*3*3*3*5*7
s3 <- vector(length=3780)
s3[c(1, 220, 3779)] <- 1
plot(dusd2(xi=s3, 12, round=9), lwd=1)

## End(Not run)
```

entropy *Information entropy*

Description

Computes the information entropy (also called Shannon entropy) of a set of discrete values, or a tabulated such set.

Usage

```
entropy(x, ...)

## S3 method for class 'table'
entropy(x, base = 2, ...)

## S3 method for class 'data.frame'
entropy(x, base = 2, ...)

## S3 method for class 'matrix'
entropy(x, base = 2, ...)

## Default S3 method:
entropy(x, base = 2, ...)
```

Arguments

x	a vector, table, data.frame or matrix. In the case of table, data.frame and matrix each row is treated as a separate set of counts or proportions, with columns representing species, types, categories etc.
...	further arguments passed to methods
base	the log base to be used.

Examples

```
entropy(c(5, 5, 4, 4, 2, 3, 5))  # default is unit bits
entropy(c(5, 5, 4, 4, 2, 3, 5), base=exp(1))  # unit nats

entropy(rep(1:4, 1:4), 4)
entropy(rep(1:4, 1), 4)

entropy(as.factor(c(1, 1, 2, 3, 4, 4)))
entropy(as.character(c(1, 1, 2, 3, 4, 4)))

mtctab <- table(mtcars$cyl, mtcars$carb)
entropy(mtctab, 6)

xx <- data.frame(bee=c(0, 0, 1, 2, 3, 2, 0, 3),
                wasp=c(1, 3, 2, 0, 1, 1, 2, 1),
                  fly=c(1, 2, 4, 2, 1, 0, 1, 0),
              beetle=c(1, 0, 0, 1, 2, 2, 0, 2),
           butterfly=c(0, 0, 0, 0, 3, 1, 0, 1))

entropy(xx)
```

`every_nth` *Select every n'th element*

Description

Select every second, third, fourth etc. element (or slice/hyperplane) of an object

Usage

```
every_nth(...)

## Default S3 method:
every_nth(x, n = 2, start = 1, ...)

## S3 method for class 'matrix'
every_nth(x, n = 2, start = 1, margin = 1, ...)

## S3 method for class 'array'
every_nth(x, n = 2, start = 1, margin = 1, ...)

## S3 method for class 'data.frame'
every_nth(x, n = 2, start = 1, margin = 1, ...)

## S3 method for class 'list'
every_nth(x, n = 2, start = 1, ...)
```

Arguments

`...`	further arguments passed to methods
`x`	an object to be selected from
`n`	selection "step size"
`start`	integer in [1:n] specifying the start of selection
`margin`	what margin to select along

Examples

```
m <- matrix(1:64, 8)
every_nth(m, n=3, start=3, margin=2)

d <- data.frame(A=1:8, B=2:9, Q=letters[rep(1:3, length.out=8)])
every_nth(d, start=2)

a <- array(1:6^4, rep(6, 4))
every_nth(a)

l <- list(a=1:3, b=2:6, c=8:5, d=9:7, e=list(ea=1:2, eb=1), f=2:6)
every_nth(l, n=2, start=2)
```

`expand` *Expand*

Description

Expand a `"table"`, a `"table"`-like object, or a list of `"table"`-like objects

Usage

```
expand(x, ...)
```

Arguments

`x`	an object to be expanded
`...`	further arguments passed to or from methods

Value

A vector with values and their repetitions specified by `x`

See Also

`dice`, `table`

Examples

```
x <- c(4, 2, 2, 2, 3, 3, 2, 4, 6, 6)
(xt <- table(x))
(xd <- dice(x))

expand(xt)
expand(xd)

expand(list(xt, xd, x))

xn <- as.table(1:4)
names(xn) <- LETTERS[1:length(xn)]
expand(xn)
```

`explode_obj` *Explode object*

Description

Presents an R object in an exploded form

Usage

```
explode_obj(x, indent = 2)
```

Arguments

`x`	an R oject, or a character string describing an R object
`indent`	how many spaces for indention (and exdention) at each level

Details

If `x` is an R oject it is first deparsed and converted into a character string describing the object. This string is then unwrapped, or exploded, according to these rules: newline and exdention after each open parenthesis, newline and indention after each close parenthesis, and newline after each comma. Parentheses and commas forming part of character strings are ignored.

Value

An exploded representation of the object is printed to console, and returned invisibly. The output is in most cases a complete and reproducible representation of the object, similarly to `dput`, but less compact and more reaviling of its inner structure.

See Also

`dput`, `dput2`

Examples

```
xc <- 'list(v=1, A=c("abv", "bom"), B=c(1:3, 31, 28), list("foo", "bar", 1))'
explode_obj(xc)

xl <- list(O=NA, R=list(j=1:3, h="(a)", q=structure(list(a=1:2, b=c("A, K",
  "B, L")), class="data.frame", row.names=c(NA, -2L))), N=1, L=FALSE)
explode_obj(xl)

mt <- 'coplot(mpg ~ disp | as.factor(cyl), data = mtcars,
       panel = panel.smooth, rows = 1)'
explode_obj(mt)
```

`factorise` *Factorise*

Description

Find the prime factors of a given integer

Usage

```
factorise(x)
```

Arguments

`x`	integer

Value

An integer vector

See Also

`factors` for unique prime factors or all integer factors

Examples

```
factorise(320)
factorise(2 * 2 * 2 * 3 * 3 * 5)

prod(factorise(5641324))

## Not run:
factorise(nextn(60000000, c(2, 3)))
factorise(72*999983)

## End(Not run)
```

`factors` *Factors*

Description

Find the integers a given number is divisible by

Usage

```
factors(x, prime = FALSE)
```

Arguments

`x`	an integer
`prime`	should only prime factors be returned?

Value

An integer vector

Note

The trivial factors `1` and `x` itself are not included.

See Also

`factorise` for prime factorisation

Examples

```
factors(210)
factors(210, prime=TRUE)
```

fitrange — *Fit to a range*

Description

Linearly shift and scale a numeric vector so that it fits to a given range.

Usage

```
fitrange(x, lower = -1, upper = 1)
```

Arguments

`x`	a numeric vector
`lower`	the lower bound of the new vector
`upper`	the upper bound of the new vector

See Also

`norma`

Examples

```
range(fitrange(runif(10, -2, 1.5), 0, 1))

fitrange(c(2, 3, 5, 7, 4), 1, 0)
# same, but without warning
1 - fitrange(c(2, 3, 5, 7, 4), 0, 1)
```

flatten — *Flatten list*

Description

Flatten a (nested) list to a list of its leaves

Usage

```
flatten(x, flatten.df = FALSE, keep.order = TRUE)
```

Arguments

`x`	a list object
`flatten.df`	should `data.frames` also be flattened?
`keep.order`	keep the order of the original list, same as seen when using `str`

Details

The nodes of the supplied list is traversed from root to leaf and successively unlisted until no lists are left (except possibly for `data.frames`).

Value

A single level list of x's leaves.

Examples

```
xl <- list(
  O=NA,
  R=list(
    j=1:3,
    h="(a)",
    q=data.frame(
      a=1:2,
      b=c("A, K", "B, L"),
      stringsAsFactors=FALSE
    )
  ),
  N=1,
  L=FALSE
)

flatten(xl, flatten.df=TRUE, keep.order=FALSE)
flatten(xl, flatten.df=TRUE, keep.order=TRUE)
str(xl)
```

`forecasts` *Return forecasts*

Description

Return forecasts and actual data from `compare_forecasts` object

Usage

```
forecasts(x)
```

Arguments

x	a `compare_forecasts` object

Value

A multivarite time series (`mts`) with the actual data, the holdout, on the first column, and the forecasts on the rest.

gcd — *Greatest common divisor*

Description

Find the largest integer, that when two numbers are divided by it, returns an integer in both cases

Usage

```
gcd(x, y)
```

Arguments

`x, y`	integers whose greates common divisor is to be found

Examples

```
gcd(sequence(10:16), rep(10:16, 10:16))
```

incdiff — *Increase difference*

Description

Rearrange a sorted numeric sequence so that the difference between subsequent elements is increased

Usage

```
incdiff(x, step = 2)
```

Arguments

`x`	a numeric sequence
`step`	how long a step the difference is considered for.

Details

With `step=2` (default) only the difference between immediate neighbours are considered; the difference between every second element will remain small, or rather reduced, compared to the original sequence. With `step=3` say, differences of both lag 1 and 2 is increased, but the difference of lag 1 will be less than if a step of 2 was used.

Examples

```
x <- 1:100
diff(x)

diff(incdiff(x, 2))
diff(incdiff(x, 3))

diff(incdiff(x, 2), 2)
diff(incdiff(x, 3), 2)

# incdiff will introduce a periodicity equal to the step length
acf(incdiff(x, 10))

# useful for making a sequence of colours more distinct
y <- seq(0.4, 1, l=18)
cols1 <- hsv(y, 1, y)
cols2 <- hsv(y, 1, incdiff(y, 3))

plot(y, col=cols1, pch=16, cex=5, ylim=c(0.4, 1.5))
points(y+0.5, col=cols2, pch=16, cex=5)
```

`indexvalue` *Index–value representation of arrays*

Description

Represent an array as columns of dimensional indices and value

Usage

```
indexvalue(x, reverse = FALSE)
```

Arguments

`x`	an array or something that can be coerced into an array
`reverse`	logical; convert from Index–value representation to regular array representation?

Details

An n-dimensional array will be unfolded to a n+1-column data.frame where the first n columns represent the indices of the n dimensions, and the last column gives the value found at each index tuple. The reverse process can also be performed.

See Also

`latin_sq`

Examples

```
arr <- array(1:(2*3*4), dim=c(2, 3, 4))
arr.is <- indexvalue(arr)

# can be used to permutate an array
indexvalue(arr.is[,c(2, 1, 3, 4)], rev=TRUE)
aperm(arr, c(2, 1, 3))

# can interpret values (symbols) as dimensional indices and permute them as well
arr2 <- array(rep(1:6, 4), dim=c(2, 3, 4))
arr2.is <- indexvalue(arr2)
indexvalue(arr2.is[,c(1, 2, 4, 3)], rev=TRUE)

# a latin square will produce an "orthogonal array"
set.seed(1)
lsq <- latin_sq(5)
iv <- indexvalue(lsq)
iv

# any permutation of a latin square is also a latin square
indexvalue(iv[, c(1, 3, 2)], reverse=TRUE)
```

`intsect` *Intersect*

Description

Performs set intersection on a list of vectors

Usage

```
intsect(x)
```

Arguments

`x`	list of sets (vectors of same mode or factors)

Details

The intersection between the sets in the list is found. This means no duplicate values are returned, whether or not there were any in the input.

Value

A vector of same mode as input, or a single factor object if input was factor.

Examples

```
intsect(list(0:6, c(2, 4, 6, 8), 3:8))

fc <- factor(LETTERS[sample(1:5, 20, rep=TRUE)])
fcl <- split(fc, sample(1:3, 20, rep=TRUE))

intsect(fcl)
```

is_coprime *Coprimality check*

Description

Test whether to integers are coprime, that is, have no factors in common

Usage

```
is_coprime(x, y)
```

Arguments

x, y	integers to be tested for coprimality

Value

A logical vector

Examples

```
is_coprime(sequence(10:16), rep(10:16, 10:16))
is_coprime(2*3*5*7, 11*13)
```

is_prime *Primality check*

Description

Test integers for whether they are prime or not

Usage

```
is_prime(x)
```

Arguments

x	vector of integers

See Also

primes

latin_sq	*Latin square*

Description

Generate latin squares, either randomly or ordered

Usage

```
latin_sq(n, random = TRUE, reduce = TRUE)
```

Arguments

n	integer; number of unique values (aka. symbols)
random	logical; should the square be generated randomly?
reduce	logical; should the square be in reduced form?

Details

Computation time increses rapidly with `n`. On my computer generating a random square with `n=12` takes about ten minutes, marking the upper limit of practicability, or even stretching it a little. A latin square in `reduced` form will have elements in the first row and the first column in a sorted order. By setting `reduced=TRUE` the first row and the first column will always be `1:n`.

Value

A square integer matrix of size n^2

See Also

`indexvalue`

Examples

```
set.seed(1)
ls <- latin_sq(9, reduce=TRUE)
image(ls, col=randcolours(ncol(ls)))

# The more "classic" representation with latin capital letters
ls[] <- LETTERS[ls]
ls
```

`markov_seq` *Discrete markov sequence*

Description

Generate a random discrete markov sequence

Usage

```
markov_seq(tmat, init = 1, length = 1000)
```

Arguments

`tmat`	a transition matrix
`init`	the initial state
`length`	length of the sequence

Examples

```
m <- matrix(c(0.5, 0.3, 0.2,
              0.2, 0.6, 0.2,
              0.2, 0.3, 0.5), 3, byrow=TRUE)

set.seed(1)
ms <- markov_seq(m)

colMeans(m)
prop.table(table(ms))
prop.table(table(tail(ms, -1), head(ms, -1), dnn=c("n", "n+1")), 1)
```

`math_constants` *Mathematical constants*

Description

Various mathemathical constants available as global variables

Format

An object of class `numeric` of length 1.

Details

`e` Euler's number

`pi` Archimedes' number, the circle constant

`phi` Golden ratio

`feig1` Feigenbaum's first constant, δ; bifurcation velocity

`feig2` Feigenbaum's second constant, α; reduction parameter

`eu.ma` Euler–Mascheroni constant

`khin` Khintchine's constant

`glai.kin` Glaisher-Kinkelin constant

math_constants_char *High precision mathematical constants*

Description

Character strings representing various mathemathical constants to ~100 decimal points

Format

An object of class `character` of length 1.

Details

`e.char` Euler's number

`pi.char` Archimedes' number, the circle constant

`phi.char` Golden ratio

`feig1.char` Feigenbaum's first constant, δ; bifurcation velocity

`feig2.char` Feigenbaum's second constant, α; reduction parameter

`eu.ma.char` Euler–Mascheroni constant

`khin.char` Khintchine's constant

`glai.kin.char` Glaisher-Kinkelin constant

means *Generalized means*

Description

Harmonic, geometric, quadratic, cubic, power and Lehmer means.

Usage

```
harm(x, na.rm = TRUE)

geom(x, zero.rule = c("1p", "rm", "1"), na.rm = TRUE)

quad(x, na.rm = TRUE)

cubi(x, na.rm = TRUE)

powr(x, p = 1.5, na.rm = TRUE)

lehm(x, p = 2, na.rm = TRUE)
```

Arguments

`x`	numeric vector of values whose *mean is to be computed
`na.rm`	logical; should `NA` values be removed? (default TRUE)
`zero.rule`	for the geometric mean, how should zeros be dealt with? Add one before, and subtract one after the calculation (see `log1p`), remove all zeros, or replace all zeros with 1.
`p`	exponential power. For the power mean `p=-1`, `p=2` and `p=3` gives the harmonic, quadratic and cubic means, respectively. For the Lehmer mean `p=0`, `p=1` and `p=2` gives the harmonic, arithmetic and contraharmonic means, respectively.

Notice

For some of these means zeros and/or negative values are undefined, or make otherwise little sense in context. Workarounds are given for the geometric mean, but if you end up using it on data ≤ 0, the wise call would be to reconsider whether using a geometric mean really makes sense in that case.

See Also

`central.tendency`

Examples

```
funl <- substitute(c(harm, geom, mean, quad, cubi))

xl <- list(c( 1, 2, 3, 5),
           c(-1, 1, 2, 3, 5),
           c( 0, 1, 2, 3, 5),
           c(-1, 0, 1, 2, 3, 5))

m <- sapply(xl, function(x) sapply(eval(funl), function(f) f(x)))
rownames(m) <- as.character(funl)[-1]
colnames(m) <- c("posi", "1neg", "zero", "1ngz")
round(m, 3)

harm(xl[[1]]); powr(xl[[1]], -1); lehm(xl[[1]], 0)

y <- c(0, 1, 5, 0, 6, 5, 9)

geom(y, zero.rule="1p")
geom(y, zero.rule="rm")
geom(y, zero.rule="1")
```

`multidensity` *Plot multiple kernel density estimates*

Description

Plot multiple kernel density estimates in the same window, together with a legend

Usage

```
multidensity(x, main, xlab = "", ylab = "Density", xlim, ylim, col = 1:9,
  lty = 1:2, lwd = 1, add = FALSE, frame.plot = TRUE, legend = TRUE,
  x.legend = "topleft", y.legend = NULL, bty = "o",
  box.col = "#FFFFFF00", bg.legend = "#FFFFFF88", cex.legend = 0.7,
  x.intersp = 1, y.intersp = 1.5, inset = 0, xpd.legend = NA,
  horiz = FALSE, ...)
```

Arguments

`x`	a list or data.frame of numeric values
`main`	a main title for the plot. Defaults to the call made to `density`
`xlab, ylab`	labels for the x and y axes
`xlim, ylim`	the x and y limits of the plot
`col, lty, lwd`	the line colours, types and widths for lines appearing in plot and legend
`add`	if `TRUE`, add to the current plot
`frame.plot`	a logical indicating whether a box should be drawn around the plot.
`legend`	logical; if `TRUE` (the default) a legend is included with the plot
`x.legend, y.legend`	the x and y co-ordinates to be used to position the legend. They can be specified by keyword or in any way which is accepted by xy.coords
`bty`	legend box type
`box.col`	line colour for the legend box
`bg.legend`	background colour for the legend box
`cex.legend`	character expanson faftor for legend
`x.intersp, y.intersp`	horizontal and vertical character interspacing for legend
`inset`	the legends inset distance from the margins as a fraction of the plot region
`xpd.legend`	the value of `xpd` to be used while drawing the legend
`horiz`	logical; if `TRUE`, set the legend horizontally rather than vertically
`...`	further arguments passed to `density`

Value

An invisible list of the `"density"` objects the plot is based on.

See Also

`density`, `ahist`

Examples

```
set.seed(1)
dl <- list("Unif-1"=runif(80, -2.1, 2.1),
           "Unif-2"=runif(70, -1.5, 1.5),
         "Normal-1"=rnorm(50, 0, 0.866),
         "Normal-2"=rnorm(90, 0, 1))
```

```
# sqrt((sd^2)*12) # sd to unif range

md <- multidensity(dl)
head(md, 2)

multidensity(dl, adj=1.2, x.leg="topright", frame=FALSE, inset=-0.02, lty=1)
multidensity(dl, x.legend="top", horiz=TRUE, cex.legend=0.5,
  inset=-0.05, bg.legend="white")
```

`narm` *Remove* `NA`*s*

Description

Remove `NA`s from vector or matrix

Usage

```
narm(x, ...)

## Default S3 method:
narm(x, ...)

## S3 method for class 'matrix'
narm(x, margin = 1, keep = c("any", "complete"), ...)

## S3 method for class 'data.frame'
narm(x, margin = 1, keep = c("any", "complete"), ...)
```

Arguments

`x`	a vector or matrix
`...`	further arguments passed to methods
`margin`	if `x` is matrix, which margin to remove `NA`s by
`keep`	if `x` is matrix, keep rows/columns with any non-`NA` values, or keep only complete rows/columns.

Value

If `x` is a matrix and `margin` is 1 or 2, a matrix is returned. Else a vector.

Examples

```
m1 <- matrix(c(10, 20, 30, 43,
               10, NA, 32, 50,
               NA, NA, NA, NA,
               13, 22, 70, 81,
               NA, 29, NA, 41), 5, byrow=TRUE,
               dimnames=list(letters[1:5], LETTERS[1:4]))

narm(m1)
matplot(narm(apply(m1, 2, sort, na.last=TRUE)), type="l")
```

```
m1[complete.cases(m1),]
narm(m1, 1, "c") #same
narm(m1, 2, "complete") #no complete columns

m1.df <- as.data.frame(t(m1))
narm(m1.df, 2, "complete")
```

---

norma *Normalize*

Description

Linearly shift and scale a numeric vector so that it has a given range, about a given centre.

Usage

```
norma(x, c = 0, r = 2)
```

Arguments

x	a numeric vector
c	the centre (as in the midrange) for the new vector
r	the range of the new vector

See Also

fitrange

Examples

```
range(norma(runif(9, -2, 0.1), 0, 2))
```

---

pairwise *Apply function to columns/elements pairwise*

Description

Pairwise application of a function to the columns of a matrix/data.frame or elements of a list

Usage

```
pairwise(x, FUN, ..., comm = FALSE)
```

Arguments

x	a matrix or data.frame
FUN	any function that takes two vectors as input and returs a single value
...	further arguments passed to FUN
comm	logical; is FUN commutative? If true, only the lower triangle, including the diagonal, is computed

Value

An $n \times n$ square matrix with n the number of columns of x.

See Also

similarity for a few more examples

Examples

```
dtf <- data.frame(aa=c(1, 1, 2, 2, 3, 2, 4),
                  bb=c(1, 1, 2, 3, 3, 3, 4),
                  cc=c(3, 3, 2, 1, 1, 1, 1),
                  dd=c(1, 2, 2, 2, 1, 1, 2))

# Root Mean Square Deviation
pairwise(dtf, function(x, y) sqrt(mean((x-y)^2)))

# using with cor.test() to accompany cor()
pv <- pairwise(dtf, function(x, y) cor.test(x, y)$p.val)
pvn <- 6^(1.1-pv)-5
pvn[pvn<1] <- 1

set_mar(1, 1, 1, 1)
plot(0, xlim=c(0.5, 4.5), ylim=c(0.5, 4.5), cex=0, ann=FALSE, xaxt="n", yaxt="n")
text(rep(1:4, 4), rep(4:1, each=4), t(round(cor(dtf), 2)), cex=pvn,
  col=c("black", "darkgrey")[(pv>0.1)+1])
```

---

pcamean *PCA mean*

Description

Takes the average of several PCA objects

Usage

```
pcamean(...)
```

Arguments

...	prcomp, princomp or factanal objects, or a single list of such objects

Details

I don't know if this kind of calculation has any sort of merit. It was written more as an impromptu challenge than as a solution to any problem

See Also

prcomp, princomp, factanal

Examples

```
xx <- data.frame(bee=c(0, 0, 1, 2, 3, 2, 0, 3),
                wasp=c(1, 3, 2, 0, 1, 1, 2, 1),
                  fly=c(1, 2, 4, 2, 1, 0, 1, 0),
              beetle=c(1, 0, 0, 1, 2, 2, 0, 2))

set.seed(1)
r <- 1000
xxs <- replicate(r, {
  xx$random <- sample(c(0:1, 0:4), 8, r=TRUE)
  xx
  }, simplify=FALSE)

xxm <- Reduce("+", xxs) / r
xxl <- lapply(xxs, princomp)

biplot(pcamean(xxl))
biplot(princomp(xxm))
```

---

plot.histogram *Plot* histogram *object*

Description

A a very minor modification of `graphics::plot.histogram`.
Only difference is that `lwd` now specifies the width of the histogram bars' outline.

See Also

`plot.histogram`, `plot.stl`, `ahist`

---

plot.stl *Plot* stl *object*

Description

A a very minor modification of `stats::stl`.
Only difference is that the distance between the plotting window and the x and y labels is set by `par("mgp")[1]`, as it is for regular plots.

See Also

`plot.stl`, `plot.histogram`

primes *Prime number generator*

Description

Prime generator based on the sieve of Eratosthenes

Usage

```
primes(n)
```

Arguments

n	integer; all prime numbers up to this will be returned

Details

Effective for primes up to ~100,000,000.
On my lightweight laptop: 1e7 -> 0.32s, 5e7 -> 1.7s, 1e8 -> 3.7s, 2e8 -> 7.6s, 3e8 -> 15s

Source

https://stackoverflow.com/questions/3789968/generate-a-list-of-primes-up-to-a-certain-number/3791284#3791284

See Also

is_prime

quick_table *Tabulate data*

Description

Quick and simple function for creating contingency tables

Usage

```
quick_table(x, na.rm = FALSE)
```

Arguments

x	a vector or factor object
na.rm	should NAs be included

Value

A data.frame with columns val (the original values and class of x) and freq (the count, or frequency, of each value in x, integer). The rows are sorted by frequency in descending order.

Examples

```
set.seed(1)
m <- sample(c(rep(NA, 5), rpois(45, 3)))
quick_table(m)
```

---

randcolours *Random colours*

Description

Generate a randomly selected colour palette

Usage

```
randcolours(n, l = c(0.2, 0.9), c1 = c(0, 1), c2 = c(0, 1), alpha = 1,
  space = c("Luv", "Lab"))
```

Arguments

n	number of colours
l	lightness range
c1	colour channel one range
c2	colour channel two range
alpha	alpha channel range
space	should the parameters be interpreted as Luv or Lab components?

Details

The range of `l`, `c1`, `c2` and `alpha`, will be interpreted as the wanted range of each colour component, whether their length is 1, 2, or more. Although they all should nominally lie within [0, 1], only `alpha` must do so to achieve a valid output. The others can exeed this range, at an icreased risk of clipping.

Examples

```
set.seed(3)
n <- 20
plot(1:n, col=randcolours(n), pch=16, cex=5)
```

`revert_par` *Revert par*

Description

Reverts `par` settings back to `old.par`

Usage

```
revert_par()
```

See Also

Other par_and_plot_margins_functions: `default_par`, `set_mar`

`rle2` *Run Length Encoding*

Description

Compute the lengths and values of runs of equal values in a vector

Usage

```
rle2(x, na.unique = FALSE, output = c("data.frame", "rle", "named vector",
  "lengths", "values"))
```

Arguments

`x`	a numeric or character vector
`na.unique`	should every `NA` be conidered unique?
`output`	what form of output

Value

Return value depends on `output`.

`data.frame` A data.frame with lengths and values columns

`rle` An object of class `"rle"`

`named vector` A vector of lengths with values as names

`lengths` The lengths as a single vector

`values` The values as a single vector

Examples

```
x <- c(NA, NA, 1, 2, 3, 3, NA, NA, NA, 2, 2, 2, NA, 1, 1, NA, NA)
rle2(x)

m <- matrix(c(
  0.7, 0.2, 0.1,
  0.2, 0.6, 0.2,
  0.1, 0.2, 0.7
), 3, byrow=TRUE)

set.seed(1)
y <- LETTERS[markov_seq(m, length=100)]
rle2(y, out="named")


# Same result as rle
rle2(x, na.unique=TRUE, output="rle")
rle(x)

# inverse.rle works as long as output is "rle"
inverse.rle(rle2(x, output="rle"))
```

`seq_range` *Generate a sequence spanning a given range*

Description

Generate a sequence spanning a given range

Usage

```
seq_range(x, ..., spread)
```

Arguments

`x`	a single numeric, a range, or a sequence
`...`	further arguments passed to `seq`
`spread`	use `spread_seq` to spread out the range by a given factor

Details

If `x` is a single number, the range is interpreted to be `[0, x]`. If `x` is length two, the numbers are interpreted as the left and right extrema of the sequence interval. If `x` is longer than two, the sequence is based upon its `range`.

Examples

```
seq_range(c(1, 4), by=0.5)
seq_range(c(1, 4), by=0.5, spread=2)
seq_range(4)
```

```
x <- sample(1:10, 3)
seq_range(x)
```

`set_mar` *Set plot margins*

Description

Moves axis titles and labels closer to the plotting window and shrinks the margins

Usage

```
set_mar(x = 1.8, y = 1.8, main = 1, right = 1)
```

Arguments

`x`	margin width for the x axis, default 2
`y`	margin width for the x axis, default 2
`main`	margin width for the main title, default 1, no title
`right`	margin width for the right edge, default 1

Details

Old `par` settings are stored in `.old.par` before a call to `par` of the form `par(mar=c(x, y, main, right), mgp=c(1.9,` is made.

See Also

Other par_and_plot_margins_functions: `default_par`, `revert_par`

Examples

```
ymse:::.old.par
get("old.par", envir=ymse:::ymseEnv)
ls(envir=ymse:::ymseEnv)

par(col.axis=2)
plot(1:4)

set_mar()
plot(1:4)

default_par()
plot(1:4)

revert_par()
plot(1:4)

ymse:::.old.par
head(get("old.par", envir=ymse:::ymseEnv))
```

similarity *Similarity measure*

Description

Calculate the similarity between two character vectors based on a similarity matrix

Usage

```
similarity(x, y, sm = smat(x, y), sfun = sum, ...)
```

Arguments

x	a character vecor or two-column data.frame/matrix
y	a character vector. Ignored if x is data.frame/matrix
sm	a similarity matrix. By default a unit matrix
sfun	function used to summarise the elementwise similarities
...	further arguments passed to sfun

See Also

smat

Examples

```
# In its most basic form similarity() gives the Hamming distance
similarity(c(1, 0, 1, 0), c(1, 1, 0, 0))


# Symmetry not required.
bef <- c(1, 2, 3, 1, 2, 3, 1, 2, 3)
aft <- c(0, 2, 2, 1, 2, 2, 1, 1, 2)

# Here a decrease in value of 1 is considered
# more similar than an increase in value of 1.
sm1 <- t(structure(c(
3, 0, 0, 0,
2, 3, 0, 0,
0, 2, 3, 0,
0, 0, 2, 3),
.Dim=c(4L, 4L),
.Dimnames=list(c("0", "1", "2","3"), c("0", "1", "2", "3"))))

# Symmetric version
sm2 <- t(structure(c(
3, 1, 0, 0,
1, 3, 1, 0,
0, 1, 3, 1,
0, 0, 1, 3),
.Dim=c(4L, 4L),
.Dimnames=list(c("0", "1", "2","3"), c("0", "1", "2", "3"))))
```

```
similarity(bef, aft, sm1)
similarity(bef, aft, sm2)

# Pre-aligned fragments of insulin genes
data(insulin)

# Transition-transversion matrix
data(smt)

# Using pairwise() to run similarity() over all column pairs
pairwise(insulin, similarity, smt, sfun=mean)

# Imagined result from questionnaire
qu <- data.frame(
  Alice=c("happy", "sad", "angry", "unsure", "happy", "sad", "happy", "angry"),
  Bob=c("happy", "sad", "angry", "angry", "happy", "angry", "angry", "sad"),
  Charlie=c("sad", "sad", "unsure", "unsure", "happy", "sad", "angry", "sad"),
  stringsAsFactors=FALSE
)

# Similarity matrix describing the relative similitudes of the moods
emsm <- as.matrix(read.table(text="
       happy  sad  angry unsure
 happy   5     0     1      1
   sad   0     5     2      1
 angry   1     2     4      2
unsure   1     1     2      3",
header=TRUE))

pairwise(qu, similarity, sm=emsm/5, sfun=mean)
```

---

simple_loess *Simplified Local Polynomial Regression Fitting*

Description

A simplified interface to the `loess` and `predict.loess` combo.

Usage

```
simple_loess(...)

## Default S3 method:
simple_loess(y, x = seq_along(y), xout = sort(x),
  span = 0.75, periodic = FALSE, ...)

## S3 method for class 'data.frame'
simple_loess(df, xout = sort(df[, 1]), ...)
```

Arguments

...	further arguments passed to `loess`

`y`	the response values to be regressed
`x`	the regressor, by default an integer sequence along y
`xout`	values used for prediction, unless it is an integer of length 1. In that case xout specifies the number of equally spaced values on the interval of x to be used. By default the same as x
`span`	parameter controlling the degree of smoothing
`periodic`	should the input be treated as periodic?
`df`	a data.frame with x-values in the first column and y-vlues in the second

Value

A data.frame with columns *xout* and *y.predicted*

Examples

```
# Simple equally spaced vector
h <- c(-0.63, 0.2, -0.44, 1.6, 0.33, -0.74, -0.82, 0.29, 0.74, 0.58, -0.3)

plot(h)
lines(simple_loess(h))

# More complicated unequally space x-values
x <- c(4, 3, 2, 5, 6, 7, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19)
y <- c(3, 2, 4, 5, 6, 5, 5, 3, 4, 7, 10, 10, 8, 9, 7, 8)

plot(x, y)
lines(simple_loess(y, x), col="gray40")
points(simple_loess(y=y, x=x, xout=5L), col=2, cex=2)
points(simple_loess(y=y, x=x, xout=17), col=3, cex=2)
points(simple_loess(y=y, x=x, xout=seq(8, 12, 0.3)), col=3, pch=16)
lines(simple_loess(y=y, x=x, xout=50L), col=4, lty=2)

# data.frame input
dtf <- data.frame(x, y)
simple_loess(dtf)
```

`simple_table` *Read a simple table*

Description

Read tables given in more or less elaborate human-readable formats

Usage

```
simple_table(x, header = TRUE, rem.dup.header = header,
  na.strings = c("NA", "N/A"), stringsAsFactors = FALSE, ...)
```

Arguments

`x`	a teble represented as a character string
`header`	are the table columns named? By default `TRUE`
`rem.dup.header`	remove duplicated headers.
`na.strings`	a character vector of strings which are to be interpreted as `NA` values
`stringsAsFactors`	should character vectors be converted to factors? By default `FALSE`
`...`	further arguments passed to `read.table`

Value

A `data.frame` containing a representation of the data.

Examples

```
x1 <- "
+------------+------+------+----------+--------------------------+
|    Date    | Emp1 | Case | Priority | PriorityCountinLast7days |
+------------+------+------+----------+--------------------------+
| 2018-06-01 | A    | A1   |        0 |                        0 |
| 2018-06-03 | A    | A2   |        0 |                        1 |
| 2018-06-02 | B    | B2   |        0 |                        2 |
| 2018-06-03 | B    | B3   |        0 |                        3 |
+------------+------+------+----------+--------------------------+
"

x2 <- "

    Date    | Emp1 | Case | Priority | PriorityCountinLast7days

 2018-06-01 | A    | A|1  |        0 |                        0
 2018-06-03 | A    | A|2  |        0 |                        1
 2018-06-02 | B    | B|2  |        0 |                        2
 2018-06-03 | B    | B|3  |        0 |                        3

"

x3 <- "
 Maths | English | Science | History | Class

  0.1  |  0.2    |  0.3    |  0.2    |  Y2

  0.9  |  0.5    |  0.7    |  0.4    |  Y1

  0.2  |  0.4    |  0.6    |  0.2    |  Y2

  0.9  |  0.5    |  0.2    |  0.7    |  Y1
"

x4 <- "
         Season |   Team  | W | AHWO
-------------------------------------
1  |  2017/2018 |  TeamA  | 2 | 1.75
2  |  2017/2018 |  TeamB  | 1 | 1.85
```

```
3  |  2017/2018 |  TeamC  | 1 | 1.70
4  |  2017/2018 |  TeamD  | 0 | 3.10
5  |  2016/2017 |  TeamA  | 1 | 1.49
6  |  2016/2017 |  TeamB  | 3 | 1.51
7  |  2016/2017 |  TeamC  | 2 | 1.90
8  |  2016/2017 |  TeamD  | 0 | N/A
"

x5 <- "
    A   T   G   C
   ---------------
A | 6 | 0 | 4 | 0 |
  |---:---:---:---
T | 0 | 6 | 0 | 4 |
  |---:---:---:---
G | 4 | 0 | 6 | 0 |
  |---:---:---:---
C | 0 | 4 | 0 | 6 |
   ---------------
"

x6 <- "
------------------------------------------------------------
|date              |Material          |Description         |
|----------------------------------------------------------|
|10/04/2013        |WM.5597394        |PNEUMATIC           |
|11/07/2013        |GB.D040790        |RING                |
------------------------------------------------------------

------------------------------------------------------------
|date              |Material          |Description         |
|----------------------------------------------------------|
|08/06/2013        |WM.4M01004A05     |TOUCHEUR            |
|08/06/2013        |WM.4M010108-1     |LEVER               |
------------------------------------------------------------
"

lapply(c(x1, x2, x3, x4, x5, x6), simple_table)
```

smat *Similarity matrix*

Description

Create a similarity matrix

Usage

```
smat(x, y, s, byrow = FALSE)
```

Arguments

x an object containing the values the similarity matrix should be computed for

`y`	same as `x`. If given the union of values in `x` and `y` are used, if not the unique values of `x` are used
`s`	a vector for filling the matrix. By default producing an identity matrix
`byrow`	should s fill the matrix by row?

Value

A square matrix with the values of `s` and row-/colnames of the unique values in {x, y}.

See Also

`similarity`

Examples

```
smat(1:3)

smat(c("f", "e", "d"), s=c(
4, 1, 1,
1, 3, 2,
1, 2, 3
))
```

`speedskate` *2018 MarbleLympics speed skating times*

Description

Intermediate and total times for all 16 runs, arranged by lane and heat number.

Usage

```
speedskate
```

Format

A list containing two data.frames, one for each lane. Columns are heat and rows are time checks in seconds.

Source

https://www.youtube.com/watch?v=fA-O6f_jArk

Examples

```
tt <- t(do.call(cbind, speedskate))
pairs(tt)
cor(tt)
outer(
  colnames(tt),
  colnames(tt),
  Vectorize(function(i,j) cor.test(tt[,i],tt[,j])$p.value)
)
```

`spread_seq` *Spread sequence*

Description

Spread out the values of a numeric vector

Usage

```
spread_seq(x, f = 1.1, ..., node = c("midrange", "first", "last", "mean",
  "median", "min", "max"))
```

Arguments

`x`	a numeric vector
`f`	numeric or item matching a function. If numeric, a multiplicative factor applied to the distance between points, otherwise a function to be applied to differences
`...`	further arguments passed to `f` if matching a function
`node`	the location of `x` that will remain unchanged

Examples

```
x <- c(-1, 0, 2, NA, 4, 5, 6, 8, 9)

spread_seq(c(-1, 1))
spread_seq(x, 1.5, "midrange")
spread_seq(x, 1.5, "first")
spread_seq(x, 1.5, "last")
spread_seq(x, 1.5, "mean")
spread_seq(x, 1.5, "median")

spread_seq(c(3, 4, 1, 9, 6))
spread_seq(c(3, 4, 1, 9, 6), 2, "min")
spread_seq(c(3, 4, 1, 9, 6), 2, "max")

spread_seq(c(3, 4, 1, 9, 6), "/", 2)
spread_seq(c(3, 4, 1, 9, 6), 0.5)

y <- sort(c(3, 4, 1, 9, 6))
plot(y)
lines(spread_seq(y, "log1p"))

f <- function(x) sqrt(abs(x)*2)*sign(x)
y <- c(3, 4, 1, 9, 6)
plot(y)
lines(spread_seq(y, f=f))
```

`summary.stl` *Summarizing seasonal decomposition*

Description

Summary method for class "stl".

Usage

```
## S3 method for class 'stl'
summary(object, digits = getOption("digits"), ...)
```

Arguments

object	an object of class "stl"
digits	the number of significant digits to use when printing
...	further arguments passed to or from other methods

Details

This function is a slight modification to `stats:::summary.stl`, the main change being the addition of the variance statistic, which can be considered a parametric (normal) compliment to the existing IQR statistic.

Examples

```
set.seed(1)
x <- ts(rnorm(1e4, sd=1), frequency=12)
a <- stl(x, s.window="periodic")
stats:::summary.stl(a)
summary(a)

b <- stl(co2, s.window="periodic")
summary(b)
```

`tied_triple_test` *Tied triple test*

Description

Compare numeric values, returning an inbetween value for ties

Usage

```
x %ttt% y

ttt(x, y)

is.ttt(x)

## S3 method for class 'ttt'
print(x, symbols = TRUE, ...)

## S3 method for class 'ttt'
table(...)
```

Arguments

x, y	numeric values to be compared
symbols	should symbols be used instead of numeric values?
...	further arguments passed to methods

See Also

Comparison, comparison_with_ties

Examples

```
1:5 %ttt% 3

ttt(1:3, 2)
print(ttt(1:3, 2), FALSE)

c(1, 6, 3, 0) %ttt% c(1, 3, 3, 2)

# Equivalent
as.integer(c(1, 6, 3, 0) %ttt% c(1, 3, 3, 2))
sign(c(1, 6, 3, 0) - c(1, 3, 3, 2))

# Demonstrating table method
dtf <- data.frame(x=1:5, y=3)
dtf$`?` <- ttt(dtf$x, dtf$y)
dtf

x <- c(8, 4, 6, 8, 9, 6, 5, 7, 0, 3, 2, 1, 5, 6, 4, 7, 6,
       3, 1, 9, 5, 6, 7, 7, 4, 5, 8, 6, 2, 5, 9, 5, 4, 8)
y <- c(1, 3, 2, 4, 6, 0, 5, 3, 7, 5, 7, 4, 5, 6, 0, 1, 4,
       2, 4, 3, 1, 5, 3, 9, 2, 2, 4, 7, 5, 6, 8)

ou <- outer(sort(x), sort(y), "%ttt%")
ta <- table(ou)

pa <- capture.output(ta)

par(mar=c(1, 2, 3, 2))
image(ou, col=topo.colors(length(ta)), axes=FALSE)
title(pa)
```

```
box()
```

var_th *Theoretical variance*

Description

Use Calculate the theoretical variance of base probability distributions

Usage

```
var_th(p, distribution = c("uniform", "exponential", "gamma", "t",
  "students-t", "bates", "binomial", "nbinom", "negative binomial", "beta", "f",
  "geometric", "hypergeometric", "lognormal", "log-normal", "weibull",
  "signed-rank", "rank-sum", "logistic"))
```

Arguments

p	a named vector of parameter values, or a single unnamed numeric if only one parameter. Use a data.frame with appropriately named columns to calculate several variances of the same distribution.
distribution	the name of the distribution to calculate the variance of

Details

The parameters and their names are the same as used in their respective density function. In some cases, like gamma, (negative) binomial etc. more than one convention is followed.

See Also

Distributions

Examples

```
var_th(p=data.frame(min=1:2, max=5:6), dist="unif")
var(runif(1e5, 1, 5))

var_th(p=2:3, dist="exp")
var(rexp(1e5, 2))

var_th(p=data.frame(shape=3:2, scale=c(0.8, 1)), dist="gamma")
var(rgamma(1e5, shape=3, scale=0.8))

var_th(p=c(shape=3, rate=1.25), dist="gamma")
var(rgamma(1e5, shape=3, rate=1.25))

var_th(p=18:20, dist="t")
var(rt(1e5, 18))

var_th(p=c(a=1, b=2, n=3), dist="bates")
var(rbates(1e5, a=1, b=2, nr=3))
```

```
var_th(p=c(size=10, prob=0.8), dist="binom")
var(rbinom(1e5, 10, 0.8))

var_th(p=c(size=10, prob=0.8), dist="nbinom")
var(rnbinom(1e5, size=10, prob=0.8))

var_th(p=c(size=10, mu=2), dist="nbinom")
var(rnbinom(1e5, size=10, mu=2))

var_th(p=data.frame(shape1=c(1, 2), shape2=c(1.5, 1)), dist="beta")
var(rbeta(1e5, shape1=1, shape2=1.5))
var(rbeta(1e5, shape1=2, shape2=1))

var_th(p=c(df1=6, df2=11), dist="f")
var(rf(1e5, 6, 11))

var_th(p=c(m=3, n=3, k=2), dist="hypergeom")
var(rhyper(1e5, m=3, n=3, k=2))

var_th(p=c(meanlog=0, sdlog=1), dist="log-normal")
var(rlnorm(1e5, meanlog=0, sdlog=1))

var_th(p=c(shape=2, scale=1), dist="weibull")
var(rweibull(1e5, shape=2, scale=1))

var_th(p=20, dist="signed-rank")
var(rsignrank(1e5, n=20))

var_th(p=c(m=13, n=10), dist="rank-sum")
var(rwilcox(1e5, m=13, n=10))
```

`weekday` *Week-day names*

Description

Convert numeric, character, factor and date-time vectors to week-day names

Usage

```
weekday(x, ...)

## Default S3 method:
weekday(x, short = TRUE, language = c("english",
  "nn norwegian", "bm norwegian"), ...)

## S3 method for class 'Date'
weekday(x, ...)

## S3 method for class 'POSIXt'
weekday(x, ...)
```

Arguments

`x`	a vector
`...`	further arguments passed to methods
`short`	if `TRUE` the names will be returned in shortened form
`language`	what language the names should be returned in

Details

This function follows the ISO 8601 standard, meaning that Monday is considered the first day of the week.

Examples

```
weekday(c("c", "b", "a"))
weekday(c("3", "2", "1"))
weekday(3:1)

weekday(Sys.Date())
weekday(Sys.Date(), short=FALSE, lang="nn nor")
```

---

ymse *ymse: A collection of more or less useful functions*

Description

There is no grand "theme" to ymse, other than that none of the functions, and in some cases function groups and classes, seemed to fit too well in any other package or merit their own package entirely.

ymse functions

`addrows` Add rown to a data.frame `ahist` Create an average shifted histogram

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