

Package ‘swfscMisc’

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Type Package

Title Miscellaneous Functions for Southwest Fisheries Science Center

Description Collection of conversion, analytical, geodesic, mapping, and plotting functions. Used to support packages and code written by researchers at the Southwest Fisheries Science Center of the National Oceanic and Atmospheric Administration.

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URL <https://github.com/EricArcher/swfscMisc>

BugReports <https://github.com/EricArcher/swfscMisc/issues>

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Author Eric Archer [aut, cre]

Maintainer Eric Archer <eric.archer@noaa.gov>

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affin.prop

Affinity Propagation

Description

Runs the Affinity Propagation clustering algorithm of Frey and Dueck, 2007.

Usage

```
affin.prop(sim.mat, num.iter = 100, stable.iter = 10, shared.pref = "min",
lambda = 0.5)
```

Arguments

sim.mat	a similarity matrix between individuals to be clustered.
num.iter	maximum number of iterations to attempt.
stable.iter	number of sequential iterations for which consistent clustering is considered acceptable.
shared.pref	type of shared preference to use. Can be one of "min", "median", or a numeric value.
lambda	damping factor.

Value

A matrix with one row per sample in 'sim.mat' and one column for each iteration. Values in columns indicate cluster assignment (arbitrary numbers) for each sample.

Author(s)

Eric Archer <eric.archer@noaa.gov>

References

Frey, B.J., and D. Dueck. 2007. Clustering by passing messages between data points. *Science* 315:972-976

Examples

```
data(iris)

# Take 75 random iris rows for example
iris <- iris[sample(1:nrow(iris), 75), ]
iris <- droplevels(iris)

iris.sim <- -dist(iris[, -5])

iris.affin <- affin.prop(iris.sim, stable.iter = 5)
table(iris$Species, iris.affin[, ncol(iris.affin)])
```

autoUnits

Auto Time Interval Units

Description

Convert time interval units to natural values based on magnitude of difference.

Usage

```
autoUnits(x)
```

Arguments

x an object inheriting from class `difftime`

Author(s)

Eric Archer <eric.archer@noaa.gov>

Examples

```
autoUnits(as.difftime("0:3:35"))
autoUnits(as.difftime("15:3:35"))
autoUnits(ISOdate(2000, 5, 1) - ISOdate(2000, 4, 20))
```

bearing

Calculate Bearing Between Two Positions

Description

Calculates the bearing between two points, given each point's latitude and longitude coordinates

Usage

```
bearing(lat1, lon1, lat2, lon2)
```

Arguments

lat1, lon1 numeric. The latitude and longitude of the starting coordinate in decimal degrees.

lat2, lon2 numeric. The latitude and longitude of the ending coordinate in decimal degrees.

Value

vector with initial and final bearings.

Author(s)

Eric Archer <eric.archer@noaa.gov>

Examples

```
# What is the bearing from San Diego, CA to Honolulu, HI?
bearing(32.87, -117.25, 21.35, -157.98)
```

box.area	<i>Area of a Box</i>
----------	----------------------

Description

Calculate the area of a square on the earth.

Usage

```
box.area(lat, lon, edge, units = "nm")
```

Arguments

lat, lon	The latitude and longitude of the lower right corner of the box in decimal degrees.
edge	The length of one side of the square in decimal degrees.
units	units of distance. Can be "km" (kilometers), "nm" (nautical miles), or "mi" (statute miles).

Author(s)

Eric Archer <eric.archer@noaa.gov>

Examples

```
#What is the area of a 5 degree grid off of San Diego, CA?  
box.area(32.87, -117.25, edge = 1, units = "nm")  
box.area(32.87, -117.25, edge = 1, units = "km")  
box.area(32.87, -117.25, edge = 1, units = "mi")
```

braces	<i>Braces</i>
--------	---------------

Description

Adds curly braces to a plot.

Usage

```
braces(xfrom, xto, yfrom, yto, radius = 1, col = par("fg"),  
       lty = par("lty"), lwd = par("lwd"))
```

Arguments

`xfrom`, `xto`, `yfrom`, `yto` start and end points of braces. Direction of brace determined by from and to arguments.

`radius` radius of curve in brace.

`col`, `lty`, `lwd` color, line type, and line width of braces. See [par](#) for more details.

Note

Orientation of brace is either horizontal or vertical, with axis along largest range of x or y in plotting units.

Author(s)

Tim Gerrodette <tim.gerrodette@noaa.gov>

Examples

```
plot(x = c(0, 1), y = c(0, 1000), type = "n", xlab = "", ylab = "")
braces(xfrom = 0.2, xto = 0.8, yfrom = c(400, 600), yto = c(300, 700))
plot(x = c(0, 100), y = c(0, 17), type = "n", xlab = "x", ylab = "y")
text(10, 16, "radius =")
for (i in 1:8) {
  braces(xfrom = 10 * i + 10, xto = 10 * i + 18, yfrom = 1,
        yto = 15, radius = i / 4, lwd = 2)
  text(10 * i + 12, 16, round(i / 4, 2))
}
plot(c(0, 100), c(0, 17), type = "n", xlab = "x", ylab = "y")
braces(30, 80, 13, 11, 1)

plot(c(0, 100), c(0, 17), type = "n", xlab = "x", ylab = "y")
braces(c(20, 80, 30), c(10,75,40), 1, 15, radius = c(0.2, 0.5, 0.1),
      lwd = c(1, 2, 3), col = 1:2, lty = 1)

plot(c(0, 100), c(0, 17), type = "n")
braces(20, 80, 7, 5, 1)
braces(20, 80, 13, 15, 1)
```

central.quantile

Central Quantile

Description

Upper and lower values of central quantile

Usage

```
central.quantile(x, pct = 0.95)
```

Arguments

x numeric vector.
 pct central percentile desired.

Value

a two element vector giving the lower and upper quantiles.

Author(s)

Eric Archer <eric.archer@noaa.gov>

Examples

```
x <- runif(1000)
central.quantile(x)
central.quantile(x, pct = 0.75)
```

circle.polygon	<i>Circle Polygon (on Earth)</i>
----------------	----------------------------------

Description

Creates a circular polygon (optionally on the earth) centered at a given point with a constant radius.

Usage

```
circle.polygon(x, y, radius, brng.limits = 0, sides = 1, by.length = TRUE,
  units = "nm", ellipsoid = datum(), dist.method = "lawofcosines",
  destination.type = "ellipsoid", poly.type = "cart.earth")
```

Arguments

x, y number specifying the coordinates of the center of the circle in decimal degrees. If poly.type is "simple.earth" or "complex.earth", this will be longitude and latitude respectively.

radius radius of sphere.

brng.limits number, or vector of two numbers. If one value is given, it is used as the starting bearing in degrees for the first point of the circle. If a vector of two values is given, then they are used as the start and end bearings of arc.

sides number that represents either length of sides or number of sides, as specified by the 'by.length' argument.

by.length logical. If TRUE, then sides is the length of sides, if FALSE, then sides is number of sides.

units	character for units of distance: Can be "km" (kilometers), "nm" (nautical miles), "mi" (statute miles).
ellipsoid	ellipsoid model parameters as returned from a call to datum .
dist.method	character specifying method for calculating distance for type = "cart.earth". See method argument of distance for more information.
destination.type	character specifying type of surface for type = "gc.earth". See type argument of destination for more information.
poly.type	character specifying the type of polygon calculation to use. Can be one of "cartesian" using basic cartesian coordinates, "cart.earth" for a simple polygon on the earth's surface treating latitude and longitude as cartesian coordinates, or "gc.earth" for a more precise calculation keeping a constant great-circle radius.

Value

A matrix representing the desired circle polygon centered at lat, lon of radius.

Author(s)

Eric Archer <eric.archer@noaa.gov>

Examples

```

cart.earth <- circle.polygon(-117.24, 32.86, 40, poly.type = "cart.earth")

lat.range <- c(32, 34)
lon.range <- c(-118.5, -116)

op <- par(mar = c(3, 5, 5, 5) + 0.1, oma = c(1, 1, 1, 1))

map("worldHires", fill = TRUE, col = "wheat3", xlim = lon.range, ylim = lat.range)
points(-117.24, 32.86, pch = 19, col = "red")
polygon(cart.earth, border = "red", lwd = 3)
lat.lon.axes(n = 3)
box(lwd = 2)
mtext("poly.type = 'cart.earth'", line = 3)

par(op)

```

color.name

Color Name

Description

Return the name of a color listed given the number.

Usage

```
color.name(i)
```

Arguments

i integer specifying color .

Value

character value of 'i' color.

Author(s)

Eric Archer <eric.archer@noaa.gov>

convert.angle *Angle Conversion*

Description

Converts angles between radians and degrees.

Usage

```
convert.angle(x, from = c("degrees", "radians"), to = c("radians",  
"degrees"))
```

Arguments

x numeric. The angle to be converted.
from, to character. Units to convert from and to. Can be "radians" or "degrees" or any partial match (case-sensitive).

Author(s)

Eric Archer <eric.archer@noaa.gov>

Examples

```
convert.angle(45, "deg", "rad")  
convert.angle(4.5, "r", "d")
```

convert.distance *Distance Conversion*

Description

Convert distances between kilometers, nautical miles, and statute miles.

Usage

```
convert.distance(x, from = c("nm", "km", "mi"), to = c("km", "nm", "mi"))
```

Arguments

x numeric. The distance to be converted.
from, to character. Units to convert from and to. Can be "km" (kilometers), "nm" (nautical miles), or "mi" (statute miles), or any partial match thereof (case sensitive).

Author(s)

Eric Archer <eric.archer@noaa.gov>

copy.tri *Copy Matrix Triangles*

Description

Copy between lower left and upper right triangles of a matrix.

Usage

```
copy.tri(x, from = "lower")
```

Arguments

x a matrix.
from triangle to copy from. Can be "lower" or "upper".

Value

a matrix.

Author(s)

Eric Archer <eric.archer@noaa.gov>

Examples

```
x <- matrix(1:9, nrow = 3)
print(x)
copy.tri(x)
```

crossing.point	<i>Crossing Point</i>
----------------	-----------------------

Description

Return point where two lines cross

Usage

```
crossing.point(l1, l2)
```

Arguments

l1, l2 matrices representing two lines, where first two columns are x and y values respectively

Value

a data.frame of x and y values of points where lines cross

Author(s)

Eric Archer <eric.archer@noaa.gov>

Examples

```
x <- 1:100
line1 <- cbind(x, 3 + 3 * x)
line2 <- cbind(x, 10 - 3 * x)
plot(line1[, 1], line1[, 2], type = "l", col = "red")
lines(line2[, 1], line2[, 2], col = "blue")
cr.pt <- crossing.point(line1, line2)
print(cr.pt)
```

 das.map

Map DAS

Description

Map sightings, effort, and beaufort from DAS file

Usage

```
das.map(x, main, spp = NULL, spp.col = rainbow(length(spp), end = max(1,
  length(spp) - 2)/length(spp)), lat.range = NULL, lon.range = NULL,
  n.ticks = 5, spp.legend.loc = "topleft", effort.legend.loc = "topright")
```

Arguments

`x` filename of a DAS file or a data.frame from [das.read](#).

`main` main title for plot.

`spp` vector of species codes to plot sightings of. If NULL, only effort will be shown.

`spp.col` vector of colors for each species.

`lat.range`, `lon.range` latitude and longitude range of map.

`n.ticks` number of desired tick marks for latitude and longitude.

`spp.legend.loc`, `effort.legend.loc` the location of the species and effort legends. Can be a single keyword as specified in [legend](#), or a two-element numeric vector giving the x (longitude) and y (latitude) coordinates.

Author(s)

Eric Archer <eric.archer@noaa.gov>

das.merge.acoustic

Merge DAS Data Into Acoustic Detections

Description

Fill in sighting information for acoustic detections from DAS file.

Usage

```
das.merge.acoustic(acoust.file, das.file, out.file)
```

Arguments

acoust.file filename of a .csv file of acoustic detections exported from Access database.
das.file filename of a DAS file.
out.file desired output .csv filename.

Author(s)

Eric Archer <eric.archer@noaa.gov>

das.read

Read DAS File

Description

Reads a DAS file into a data.frame where each line is data for a specific event.

Usage

```
das.read(file)
```

Arguments

file filename of a DAS file.

Author(s)

Eric Archer <eric.archer@noaa.gov>

das.spp.freq

Frequency of species from DAS file

Description

Returns number of sightings of each species code in a DAS file.

Usage

```
das.spp.freq(x)
```

Arguments

x filename of a DAS file or a data.frame from [das.read](#).

Author(s)

Eric Archer <eric.archer@noaa.gov>

datum	<i>Datum</i>
-------	--------------

Description

Return parameters specifying ellipsoid datum model.

Usage

```
datum(model = c("wgs84", "grs80", "airy", "international", "clarke", "grs67"))
```

Arguments

model character, specifying which model to use for ellipsoid model. Options are: "wgs84", "grs80", "airy", "international", "clarke", "grs67", or partial matches thereof (case-sensitive).

Value

vector of a, b, and f parameters.

Note

Model parameters are based on distances in km.

Author(s)

Eric Archer <eric.archer@noaa.gov>

destination	<i>Destination on Sphere or Ellipsoid</i>
-------------	---

Description

Calculates latitude and longitude of the destination along a sphere or ellipsoid.

Usage

```
destination(lat, lon, brng, distance, units = c("nm", "km", "mi"),
  ellipsoid = datum(), radius = convert.distance(6371, "km", "nm"),
  type = c("ellipsoid", "sphere", "vincenty"))
```

Arguments

lat, lon	numeric. The latitude and longitude of the coordinate in decimal degrees.
brng	numeric. The bearing, ranging from 0 to 360 degrees.
distance	numeric. The distance travelled, in units specified by units.
units	units of distance. Can be "km" (kilometers), "nm" (nautical miles), or "mi" (statute miles), or any partial match thereof (case sensitive).
ellipsoid	ellipsoid model parameters as returned from a call to datum .
radius	numeric. Define the radius for type = "sphere". In units of units.
type	Character defining type of surface. Can be "sphere", "ellipsoid", "vincenty", or partial match thereof (case-sensitive).

Value

latitude and longitude of destination.

Author(s)

Eric Archer <eric.archer@noaa.gov>

References

Ellipsoid code adapted from JavaScript by Larry Bogan <http://adsabs.harvard.edu/full/2000JRASC...94...48B>.

Vincenty code adapted from JavaScript by Chris Veness <http://www.movable-type.co.uk/scripts/latlong-vincenty-direct.html> Vincenty, T. 1975. Direct and inverse solutions of geodesics on the ellipsoid with application of nested equations. Survey Review 22(176):88-93 http://www.ngs.noaa.gov/PUBS_LIB/inverse.pdf.

Examples

```
destination(32.87, -117.25, 262, 4174, units = "km", type = "sphere")
destination(32.87, -117.25, 262, 4174, units = "km", type = "ellipsoid")
destination(32.87, -117.25, 262, 4174, units = "km", type = "vincenty")
```

distance

Distance Between Coordinates

Description

Calculates the distance between two coordinates using the Law of Cosines, Haversine, or Vincenty methods.

Usage

```
distance(lat1, lon1, lat2, lon2, radius = convert.distance(6371, "km", "nm"),
  units = c("nm", "km", "mi"), ellipsoid = datum(), iter.limit = 20,
  method = c("lawofcosines", "haversine", "vincenty"))
```

Arguments

lat1, lon1, lat2, lon2	The latitude and longitude of the first and second points in decimal degrees.
radius	radius of sphere.
units	units of distance. Can be "km" (kilometers), "nm" (nautical miles), or "mi" (statute miles), or any partial match thereof (case sensitive).
ellipsoid	ellipsoid model parameters as returned from a call to <code>datum</code> .
iter.limit	An integer value defining the limit of iterations for Vincenty method.
method	Character defining the distance method to use. Can be "lawofcosines", "haversine", "vincenty", or any partial match thereof (case sensitive).

Author(s)

Eric Archer <eric.archer@noaa.gov>

References

Code adapted from JavaScript by Chris Veness <http://www.movable-type.co.uk/scripts/latlong.html>
 Vincenty, T. 1975. Direct and inverse solutions of geodesics on the ellipsoid with application of nested equations. Survey Review 22(176):88-93
http://www.ngs.noaa.gov/PUBS_LIB/inverse.pdf.

Examples

```
# What is the distance from San Diego, CA to Honolulu, HI?
distance(32.87, -117.25, 21.35, -157.98, method = "lawofcosines")
distance(32.87, -117.25, 21.35, -157.98, method = "haversine")
distance(32.87, -117.25, 21.35, -157.98, method = "vincenty")
```

diversity

Unbiased Estimate of Diversity

Description

Calculate unbiased estimate of diversity for a vector of items

Usage

```
diversity(x)
```


Arguments

x character or numeric vector or factor

Author(s)

Eric Archer <eric.archer@noaa.gov>

fisher.method.p *Fisher's Method p-value*

Description

Calculate Fisher's method p-value to summarize a vector of p-values based on a chi-squared distribution.

Usage

fisher.method.p(p.vals)

Arguments

p.vals vector of p-values.

Author(s)

Eric Archer <eric.archer@noaa.gov>

geometric.mean *Geometric Mean*

Description

Calculates the geometric mean of a vector.

Usage

geometric.mean(x)

Arguments

x a numeric vector.

Author(s)

Eric Archer <eric.archer@noaa.gov>

Examples

```
x <- rlnorm(100)
mean(x)
median(x)
geometric.mean(x)
```

harmonic.mean	<i>Harmonic Mean</i>
---------------	----------------------

Description

Calculate the harmonic mean of a set of numbers.

Usage

```
harmonic.mean(x, na.rm = FALSE)
```

Arguments

x	a numeric vector.
na.rm	a logical value indicating whether NA values should be stripped before the computation proceeds.

Author(s)

Eric Archer <eric.archer@noaa.gov>

Examples

```
x <- rlnorm(100)
mean(x)
median(x)
harmonic.mean(x)
```

isBetween	<i>Between</i>
-----------	----------------

Description

Is a numeric value between two other values?

Usage

```
isBetween(x, a, b = NULL, include.ends = FALSE, na.convert = TRUE)
```

Arguments

x	vector of numeric values to check.
a, b	numeric values describing range.
include.ends	logical. Should test include a and b? Is test > and < or >= and <= ?
na.convert	logical. If TRUE and result of test is NA because either x, a, or b is NA, return FALSE, otherwise return NA.

Details

Order of a and b does not matter. If b is NULL the range will be taken from values in a.

Author(s)

Eric Archer <eric.archer@noaa.gov>

lab.wid	<i>Label Width</i>
---------	--------------------

Description

Calculate width of labels for plots.

Usage

```
lab.wid(labels)
```

Arguments

labels	vector of labels to be used on plots
--------	--------------------------------------

lat.lon.axes	<i>Latitude and Longitude axes</i>
--------------	------------------------------------

Description

Add latitude and longitude axes to a map.

Usage

```
lat.lon.axes(n = 5, lon.n = n, lat.n = n)
```

Arguments

n, lon.n, lat.n

the number of tick marks desired. Can be specified separately for longitude (lon.n) or latitude (lat.n). See [pretty](#) for more details.

Author(s)

Eric Archer <eric.archer@noaa.gov>

na.count	<i>Count NAs</i>
----------	------------------

Description

Counts NAs in an object.

Usage

```
na.count(x)
```

Arguments

x a vector, data.frame, or matrix.

Author(s)

Eric Archer <eric.archer@noaa.gov>

Examples

```
x <- sample(c(1:10, NA), 30, replace = TRUE)
na.count(x)
x.df <- do.call(data.frame, lapply(1:4, function(i) sample(c(1:10, NA), 30, replace = TRUE)))
colnames(x.df) <- paste("X", 1:4, sep = "")
na.count(x.df)
```

normalize	<i>Normalize a Numeric Vector</i>
-----------	-----------------------------------

Description

Normalize a numeric vector to have a mean of zero and a standard deviation of one.\

Usage

```
normalize(x)
```

Arguments

x a numeric vector.

Value

a numeric vector of the same length as x.

Author(s)

Eric Archer <eric.archer@noaa.gov>

Examples

```
x <- runif(20, 50, 110)
x.norm <- normalize(x)
mean(x)
mean(x.norm)
sd(x)
sd(x.norm)
```

odds	<i>Odds Conversion</i>
------	------------------------

Description

odds	converts probability to odds
logOdds	converts odds to log-odds
invOdds	converts odds to probability
invLogOdds	converts log-odds to odds

Usage`odds(x)``logOdds(x)``invOdds(x)``invLogOdds(x)`**Arguments**

`x` a numeric vector of probabilities (0 to 1), odds (0 to Inf), or log.odds (-Inf to Inf).

Author(s)

Eric Archer <eric.archer@noaa.gov>

Examples

```
x <- sort(runif(10))
odds.df <- data.frame(x = x, odds = odds(x), logOdds = logOdds(x))
odds.df
invOdds(odds.df$odds)
invLogOdds(odds.df$logOdds)
```

one.arg

One Argument

Description

Does the function have just one argument?

Usage`one.arg(f)`**Arguments**

`f` a function.

Author(s)

Eric Archer <eric.archer@noaa.gov>

Examples

```
one.arg(mean)
one.arg(one.arg)
```

plotAssignments *Plot assignment distributions*

Description

Plot individual assignment probability distributions.

Usage

```
plotAssignments(probs, orig, type = NULL, ylab = NULL, plot = TRUE)
```

Arguments

probs	matrix or data.frame of individual assignment probabilities. Each column represents probability of assignment to that group and rows sum to one.
orig	vector of original group assignments
type	either area for stacked continuous area plot or bar for discrete stacked bar chart. The latter is preferred for small numbers of cases. If not specified, a bar chart will be used if all classes have ≤ 30 cases.
ylab	label for y-axis
plot	display the plot?

Value

the ggplot object is invisibly returned.

Author(s)

Eric Archer <eric.archer@noaa.gov>

Examples

```
n <- 40
probs <- abs(c(rnorm(n, 80, 10), rnorm(n, 20, 10)))
probs <- (probs - min(probs)) / max(probs)
probs <- cbind(probs, 1 - probs)
colnames(probs) <- NULL
orig <- rep(c("Group.1", "Group.2"), each = n)

plotAssignments(probs, orig)

n <- 15
```

```
probs <- abs(c(rnorm(n, 80, 10), rnorm(n, 20, 10)))
probs <- (probs - min(probs)) / max(probs)
probs <- cbind(probs, 1 - probs)
colnames(probs) <- NULL
orig <- rep(c("Group.1", "Group.2"), each = n)

plotAssignments(probs, orig)
```

pVal

Permutation Test P-value

Description

Calculate the p-value for a permutation test.

Usage

```
pVal(obs, null.dist)
```

Arguments

obs	observed value.
null.dist	vector of values from permutation null distribution.

Author(s)

Eric Archer <eric.archer@noaa.gov>

Examples

```
null.dist <- rnorm(1000)
obs <- rnorm(1, mean = 1)

plot(density(null.dist), xlim = range(c(obs, null.dist)), main = "")
abline(v = obs)
print(obs)
pVal(obs, null.dist)
```

round

Rounding Numbers for Data Frames

Description

Rounds numeric columns in data.frames

Usage

```
## S3 method for class 'data.frame'  
ceiling(x)  
  
## S3 method for class 'data.frame'  
floor(x)  
  
## S3 method for class 'data.frame'  
trunc(x, ...)  
  
## S3 method for class 'data.frame'  
round(x, digits = 0)  
  
## S3 method for class 'data.frame'  
signif(x, digits = 6)
```

Arguments

x	a data.frame with numeric columns.
...	arguments to be passed to methods.
digits	integer indicating the number of decimal places (round) or significant digits (signif) to be used. See round for more details.

Details

Takes a data.frame and returns a data.frame with the specified function applied to each numeric column.

Author(s)

Eric Archer <eric.archer@noaa.gov>

See Also

[Round](#)

Examples

```
data(mtcars)

round(mtcars, 0)

signif(mtcars, 2)
```

row.col.page.fit *Number of Rows and Columns on Page*

Description

Return the number of rows and columns for n that best fits on a page of size width x height.

Usage

```
row.col.page.fit(n, width = 8.5, height = 11)
```

Arguments

n number of items (e.g., plots) to fit on page.
width, height dimensions of page.

Value

A vector listing the number of rows and columns to use.

Author(s)

Eric Archer <eric.archer@noaa.gov>

Examples

```
# 9 frames on US letter paper
row.col.page.fit(9)

# 9 frames on a square
row.col.page.fit(9, width = 10, height = 10)
```

`sample.map`*Plot Samples on World Map*

Description

Plot a set of samples on a world map.

Usage

```
sample.map(lat, lon, lat.range = NULL, lon.range = NULL, main = NULL,
           pch = 19, pt.cex = 1, col = "black", bg = col, n = 5, lon.n = n,
           lat.n = n)
```

Arguments

`lon`, `lat` vectors giving the longitude and latitude of points to plot.

`lon.range`, `lat.range`
vectors giving the minimum and maximum longitude and latitude of the map. If the first value in `lon.range` is greater than the second value, then a Pacific-centric map ([world2Hires](#)) is used and continents will not be filled in.

`main` main title for the plot.

`pch` point symbol to use.

`pt.cex` point size to use.

`col` point color.

`bg` background color of point.

`n`, `lon.n`, `lat.n`
the number of tick marks desired. Can be specified separately for longitude (`lon.n`) or latitude (`lat.n`). See [pretty](#) for more details.

Value

original [par](#) settings for `mar` and `oma`.

Author(s)

Eric Archer <eric.archer@noaa.gov>

See Also

[lat.lon.axes](#)

Examples

```
# Some random points around San Diego, CA
lat <- runif(30, 32.5, 33.3)
lon <- runif(30, -118.3, -117.5)
lat.range <- c(32.4, 33.6)
lon.range <- c(-118.6, -117)
sample.map(lat, lon, lat.range, lon.range)

# Some random points in the Pacific
lat <- runif(30, 20, 50)
lon <- c(runif(15, 150, 180), runif(15, -180, -120))
lat.range <- c(10, 75)
lon.range <- c(110, -110)
sample.map(lat, lon, lat.range, lon.range)
```

scatterdens

Scatter Plot with Density Margins

Description

Produce a scatter plot with a histogram or density plot in the margins

Usage

```
scatterdens(x, y, dens.frac = 1/5, ...)
```

```
scatterhist(x, y, xlab = "", ylab = "", dens.frac = 1/5, ...)
```

Arguments

<code>x, y</code>	vectors of points to plot.
<code>dens.frac</code>	fraction of screen to be taken up by density plots on margins.
<code>...</code>	Arguments to be passed to plot .
<code>xlab, ylab</code>	labels for x and y axes.

Author(s)

Eric Archer <eric.archer@noaa.gov>

References

Original code by Ken Kleiman: <http://sas-and-r.blogspot.co.uk/2011/06/example-841-scatterplot-with-margins.html>

Examples

```
x <- rnorm(100)
y <- rlnorm(100)
op <- par(ask = TRUE)
scatterdens(x, y, xlab = "x", ylab = "y")
par(op)
```

`sex.symbols`*Sex Symbols*

Description

Plots male and female symbols on current plot.

Usage

```
sex.symbols(x, y, sex = 1, col = par("fg"), lwd = par("lwd"), cex = 1)
```

Arguments

<code>x, y</code>	the x and y coordinates on the current plot.
<code>sex</code>	a numeric vector containing the values 1 (male) or 2 (female). If of length one, then value is recycled for all symbols.
<code>col, lwd, cex</code>	color, line width, and character expansion for each point. <code>lwd</code> and <code>col</code> are recycled as necessary to cover all points. See par for more details.

Author(s)

Tim Gerrodette <tim.gerrodette@noaa.gov>

Examples

```
x <- runif(20, 0, 10)
y <- runif(20, 0, 200)
plot(x, y, type = "n")
sex.symbols(x, y, sex = 1:2, cex = 1.5, lwd = c(1.5, 4), col = c("blue", "red"))
```

transparent	<i>Transparent Colors</i>
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Description

Return transparent form of a named color.

Usage

```
transparent(col, percent = 50)
```

Arguments

col	vector of colors as name, hexadecimal, or positive integer (see col2rgb).
percent	percent of transparency (0 = solid, 100 = transparent).

Author(s)

Eric Archer <eric.archer@noaa.gov>

Examples

```
pct <- seq(0, 100, by = 10)
plot(pct, pct, bg = transparent("red", pct), pch = 21, cex = 4, xlab = "X", ylab = "Y")
```

uniform.test	<i>Uniform Distribution Test</i>
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Description

Tests whether a histogram is significantly different from a uniform distribution.

Usage

```
uniform.test(hist.output, B = NULL)
```

Arguments

hist.output	output from a call to hist.
B	number of replicates for chi-squared permutation.

Value

result of chi-squared test.

Author(s)

Eric Archer <eric.archer@noaa.gov>

Examples

```
x.unif <- runif(100)
uniform.test(hist(x.unif), B = 1000)
x.lnorm <- rlnorm(100)
uniform.test(hist(x.lnorm), B = 1000)
```

which.nearest	<i>Which Nearest</i>
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Description

Find values of one vector that are nearest to values in another vector.

Usage

```
which.nearest(x, y)
```

Arguments

x vector of values to be compared against.

y vector of values to examine relative to x. May be of length 1.

@return For each value in y, returns index of value of x which is nearest to y in absolute value. In the case of ties, the function returns the first index of x. If nearest value is `min(x)` or `max(x)`, a warning is issued. NAs and NaNs in x are ignored; NAs and NaNs in y are returned.

Author(s)

Tim Gerrodette <tim.gerrodette@noaa.gov>

Examples

```
x <- sort(sample(1:100, 20))
y <- sort(sample(min(x):max(x), 5))
i <- which.nearest(x, y)
x
y
x[i]
```

`zero.pad`*Zero Pad Integers*

Description

Return character representation of integers that are zero-padded to the left so all are the same length.

Usage

```
zero.pad(x)
```

Arguments

`x` a vector of integers.

Author(s)

Eric Archer <eric.archer@noaa.gov>

Examples

```
x <- c(0, 1, 3, 4, 10)
zero.pad(x)
x <- c(x, 11, 12, 100, 1000)
zero.pad(x)
```


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