Package ‘sspline’

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map.world  

World Map

Description
Sketch the continental boundary to give a rough idea of the position on the world.

Usage
map.world(add=FALSE, main="", ...)

Arguments
add  a logical scalar, if TRUE, add a map to the existing plot; otherwise, plot a new world map
main a character vector, the main title of the plot
... other parameters needed to pass to the lines function

Value
NULL

Author(s)
Original in S by Steve Wofsy <<scw@io.harvard.edu>>, ported to R by Xianhong Xie.

References
S Archive under http://lib.stat.cmu.edu

Examples
map.world(main = "The World Map")

plot.smooth.sspline  

Plot a Smooth.sspline Object

Description
Plot a smoothing spherical spline using color to represent the function value.

Usage
## S3 method for class 'smooth.sspline'
plot(x, lon, lat, main="", xlab="Longitude", ylab="Latitude", key.title="Temp\n(deg)", ...)
**plot.smooth.sspline**

**Arguments**

- **x**: a `smooth.sspline` object
- **lon**: the longitudes on which the function values will be calculated
- **lat**: the latitudes on which the function values will be calculated
- **main**: the main title of the plot
- **xlab**: the x-axis label of the main plot
- **ylab**: the y-axis label of the main plot
- **key.title**: the title for the colored key
- **...**: other plotting parameters, such as `lwd`, `asp`, and...

**Details**

It calls `predict.smooth.sspline` and `filled.contour`.

**Value**

**NULL**

**Note**

The longitudes and latitudes are measured in degrees.

**Author(s)**

Xianhong Xie

**See Also**

`predict.smooth.sspline`

**Examples**

```r
subdat <- Wtdiff[sample(nrow(Wtdiff), 200), 2:4]
athead(subdat)

splobj <- smooth.sspline(lon, lat, avgd)

plot(splobj, lon=seq(-180, 180, len=50), lat=seq(-90, 90, len=25),
     main="World Average Temperature Change")
detach(subdat)
```
predict.smooth.sspline

*Spherical Smoothing Spline Prediction*

**Description**

Make prediction on the sphere using the information got from a smooth.sspline object.

**Usage**

```r
## S3 method for class 'smooth.sspline'
predict(object, lon, lat, grid=FALSE, ...)
```

**Arguments**

- **object**: a smooth.sspline object
- **lon**: the longitudes on which the prediction is to be made
- **lat**: the latitudes on which the prediction is to be made
- **grid**: whether the prediction is on a grid
- **...**: other parameters, not used

**Details**

It calls Fortran subroutine with the .Fortran interface.

**Value**

If grid = TRUE, return a matrix with dimension (length(lon), length(lat)); otherwise, return a vector of length = length(lon).

**Note**

The longitudes and latitudes are measured in degrees.

**Author(s)**

Xianhong Xie

**References**

Grace Wahba (1981), *Spline Interpolation and Smoothing on the Sphere*, SIAM J. SCI. STAT. COMPUT.

**See Also**

smooth.sspline
print.smooth.spline

Examples
subdat <- WT9397[sample(nrow(WT9397), 200), 2:4]
attach(subdat)

splobj <- smooth.spline(lon, lat, avgt)
predict(splobj, lon=seq(-180,180,len=50), lat=seq(-90,90,len=25), grid=TRUE)
detach(subdat)

print.smooth.spline  Display a Smooth.spline Object

Description
The print and summary methods for smooth.spline object.

Usage
## S3 method for class 'smooth.spline'
print(x, ...)  
## S3 method for class 'smooth.spline'
summary(object, ...)

Arguments
x         smooth.spline objects
object    smooth.spline objects
...       other parameters, not used

Value
For print.smooth.spline, a smooth.spline object; for summary.smooth.spline, NULL.

Author(s)
Xianhong Xie

Examples
subdat <- WT6367[sample(nrow(WT6367), 200), 2:4]
attach(subdat)

splobj <- smooth.spline(lon, lat, avgt)
print(splobj)
summary(splobj)
detach(subdat)
smooth.sspline

**Description**

It fits a smoothing splines on the sphere with the smoothing parameter chosen by the generalized cross validation (GCV) criteria or given by the user.

**Usage**

smooth.sspline(lon, lat, y, m = 2, smth = 0, lambda = 0)

**Arguments**

- **lon**: numeric vector, the longitudes
- **lat**: numeric vector, the latitudes
- **y**: numeric vector, the observations at (lon, lat)
- **m**: integer, order of smoothing, takes value from 1 to 10. Default to 2
- **smth**: method for choosing the smoothing parameter: 0, gcv method; 1, user specified. Default to 0
- **lambda**: used only when smth = 1.

**Details**

It calls Fortran subroutine with the .Fortran interface.

**Value**

A `smooth.sspline` object with the components

- **lon**: the original longitude
- **lat**: the original latitude
- **obs**: the original observation
- **lambda**: the lambda that minimizes the gcv score
- **gcv**: the corresponding gcv value at lambda
- **varhat**: the estimated variance
- **c**: the coefficient vector c for the estimated function
- **d**: the coefficient d for the estimated function
- **yhat**: the estimated (smoothed) observation
- **call**: the call to `smooth.sspline`

**Note**

The longitudes and latitudes are measured in degrees.
Author(s)
Xianhong Xie

References
Grace Wahba (1981), Spline Interpolation and Smoothing on the Sphere, SIAM J. SCI. STAT. COMPUT.

Examples
subdat <- Wtdiff[sample(nrow(Wtdiff), 200), 2:4]
atnach(subdat)

smooth.sspline(lon, lat, avgd)
detach(subdat)

------------------------------------------------------------------------
station Distribution of the Stations on the World
------------------------------------------------------------------------

Description
It gives a simple illumination on how the given (lon, lat) pairs distributes on the world.

Usage
station(lon=NULL, lat=NULL, pch=24, col="blue", bg="red", ...)

Arguments
lon numeric, the longitudes
lat numeric, the latitudes
pch the plotting symbol
col color value or name, the color used to draw the symbol
bg color value or name, the color used to fill the symbol
... other plotting parameters

Details
It calls the map.world to draw a world map.

Value
NULL
Note
The longitudes and latitudes are measured in degrees.

Author(s)
Xianhong Xie

See Also
map.world

Examples
```r
subdat <- WTdiff[sample(nrow(WTdiff), 200), 2:3]
attach(subdat)
station(lon, lat)
detach(subdat)
```

Description
The `WT6367` data frame has 1391 rows and 4 columns. It contains the average temperature from 1963 to 1967 for those stations having non-missing observations on the winter (Dec-Feb) for ten years (1963-1967 and 1993-1997).

Usage
`WT6367`

Format
This data frame contains the following columns:

- **recid** a numeric vector containing the coded information of the stations (length 11). The first three digits represent the country code; the next five digits, the station number; the last three digits, whether a station is a WMO station or close to one.
- **lon** a numeric vector containing the longitudes (in degrees) of the stations.
- **lat** a numeric vector containing the latitudes (in degrees) of the stations.
- **avgt** a numeric vector containing the average temperatures for the stations (rounded to the second decimal point).
Source

The Global Historical Climatology Network (GHCN)
http://www.ncdc.noaa.gov/cgi-bin/res40.pl?page=ghcn.html

Examples

```r
## Fit a smoothing spherical spline with part of the data
subdat <- WT6367[sample(nrow(WT6367), 200), 2:4]
attach(subdat)

smooth.spline(lon, lat, avgt)

detach(subdat)
```

WT9397  

*World Average Winter Temperature from 1993-1997*

Description

The WT9397 data frame has 1391 rows and 4 columns. It contains the average temperature from 1993 to 1997 for those stations having non-missing observations on the winter (Dec-Feb) for ten years (1963-1967 and 1993-1997).

Usage

WT9397

Format

This data frame contains the following columns:

- **recid** a numeric vector containing the coded information of the stations (length 11). The first three digits represent the country code; the next five digits, the station number; the last three digits, whether a station is a WMO station or close to one.
- **lon** a numeric vector containing the longitudes (in degrees) of the stations.
- **lat** a numeric vector containing the latitudes (in degrees) of the stations.
- **avgt** a numeric vector containing the average temperatures for the stations (rounded to the second decimal point).

Source

The Global Historical Climatology Network (GHCN)
http://www.ncdc.noaa.gov/cgi-bin/res40.pl?page=ghcn.html
Examples

```r
## Fit a smoothing spherical spline with part of the data
subdat <- WTdiff[sample(nrow(WTdiff), 200), 2:4]
attach(subdat)

smooth.spline(lon, lat, avgt)

detach(subdat)
```

---

### Description

The `WTdiff` data frame has 1391 rows and 4 columns. It contains the average temperature change from 1963-1967 to 1993-1997 for those stations having non-missing observations on the winter (Dec-Feb) for ten years (1963-1967 and 1993-1997).

### Usage

`WTdiff`

### Format

This data frame contains the following columns:

- **recid**: a numeric vector containing the coded information of the stations (length 11). The first three digits represent the country code; the next five digits, the station number; the last three digits, whether a station is a WMO station or close to one.
- **lon**: a numeric vector containing the longitudes (in degrees) of the stations.
- **lat**: a numeric vector containing the latitudes (in degrees) of the stations.
- **avgt**: a numeric vector containing the average temperature change from 1963-1967 to 1993-1997 for the stations.

### Source

The Global Historical Climatology Network (GHCN)


### Examples

```r
## Fit a smoothing spherical spline with part of the data
subdat <- WTdiff[sample(nrow(WTdiff), 200), 2:4]
attach(subdat)

smooth.spline(lon, lat, avgt)

detach(subdat)
```
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