Package: RainTyrol (via r-universe)

September 16, 2024

Version 0.2-0

Date 2020-01-13

Title Precipitation Observations and NWP Forecasts from GEFS

Description Precipitation observations for the month of July in the years 1985-2012 for 95 stations in Tyrol, Austria, obtained from EHYD. Numerical weather prediction (NWP) forecasts from GEFS.

LazyData yes

Depends R (>= 3.1-0)

Imports stats, utils

Suggests disttree (>= 0.2-0), gamlss, gamlss.cens, gamlss.dist, gamboostLSS, mboost, partykit, crch, scoringRules, survival, parallel, sp, raster

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Repository https://zeileis.r-universe.dev

RemoteUrl https://github.com/r-forge/partykit

RemoteRef HEAD

RemoteSha 4309c9bb2890ddf1e743e937b93a0281f28e2e17

Contents

evalmodels *Fitting and Comparing Zero-Censored Gaussian Models on Precipitation Data*

Description

The function evalmodels fits distributional trees (disttree), distributional forests (distforest), a prespecified GAMLSS (gamlss), a boosted GAMLSS (gamboostLSS), and an EMOS model (crch) to precipitation data. The results are compared based on CRPS, log-likelihood and RMSE.

Usage

```
evalmodels(station, train, test,
           ntree = 100, distfamily = "gaussian",
           tree_minsplit = 50, tree_minbucket = 20, tree_mincrit = 0.95,
           forest_minsplit = 50, forest_minbucket = 20, forest_mincrit = 0,
           forest_mtry = 27,
           gamboost_cvr = FALSE)
```

Arguments

station	character, name of the selected observation station.
train	numeric, (vector of) years the models should be trained on (available: 1985–2012)
test	numeric, (vector of) years the models should be tested on (available: 1985–2012)
ntree	numeric, number of trees in the distributional forest.
distfamily	character, name of the distribution that should be used, can be either a gaussian or a logistic distribution.
tree_minsplit	numeric, the minimum sum of weights in a node in order to be considered for splitting in the distributional tree.
tree_mincrit	numeric, the value of the test statistic or 1 - p-value that must be exceeded in order to implement a split in the distributional tree.
tree_minbucket	numeric, the minimum sum of weights in a terminal node in the distributional tree.
forest_minsplit	numeric, the minimum sum of weights in a node in order to be considered for splitting in the distributional forest.
forest_minbucket	numeric, the minimum sum of weights in a terminal node in the distributional forest.
forest_mincrit	numeric, the value of the test statistic or 1 - p-value that must be exceeded in order to implement a split in the distributional forest.

forest_mtry	numeric, number of input variables randomly sampled as candidates at each node for random forest like algorithms. The default mtry = Inf means that no random selection takes place.
gamboost_cvr	logical, Should cvrisk be applied to find the optimal value for 'mstop'.

Value

evalmodels returns a list with the following components:

CRPS	CRPS (continuos ranked probability score) of all methods, average over testing data.
LS	Logarithmic score (= log-likelihood) of all methods, average over testing data.
RMSE	Root mean squared error of all methods, average over testing data.

Examples

```
if(require("crch") &
   require("disttree") &
   require("gamlss") &
   require("gamlss.dist") &
   require("gamlss.cens") &
   require("gamboostLSS") &
   require("mboost") &
   require("partykit") &
   require("scoringRules") &
   require("survival")
) {

evalmodels(station = "Axams", train = 1985:2008, test = 2009:2012, distfamily = "gaussian")

}
```

MapTyrol *Topographic data for Tyrol*

Description

Topographic data to plot a map of Tyrol and surrounding areas.

Usage

```
data("MapTyrol")
```

Format

A list of two objects: a RasterLayer containing topographic data of Tyrol and surrounding areas and a SpatialPolygons representing the border of Tyrol.

Source

https://www.data.gv.at/katalog/dataset/vgd-stichtagsdaten-1-250-000, https://www.earthenv.org/DEM

References

Robinson N, Regetz J, Guralnick R P (2014). EarthEnv-DEM90: A Nearly-Global, Void-Free, Multi-Scale Smoothed, 90m Digital Elevation Model From Fused ASTER and SRTM Data, *ISPRS Journal of Photogrammetry and Remote Sensing*, **87**, 57–67. doi:10.1016/j.isprsjprs.2013.11.002

EarthEnv-DEM90e website: https://www.earthenv.org/DEM.html

Bundesamt für Eich- und Vermessungswesen

https://www.data.gv.at/katalog/dataset/vgd-stichtagsdaten-1-250-000

Examples

```
data("MapTyrol", package = "RainTyrol")
```

RainTyrol *Observations and covariates for all 95 stations*

Description

Observations of precipitation sums and weather forecasts of a set of meteorological quantities from an ensemble prediction system for 95 observation stations in Tyrol.

Usage

```
data("RainTyrol")
```

Format

A `data.frame` consisting of the stations' names, observation day and year, power transformed observations of daily precipitation sums and the corresponding meteorological ensemble predictions for all 95 observation stations. The base variables of the numerical ensemble predictions are listed below. For each of them variations such as ensemble mean/standard deviation/minimum/maximum are included in the dataset. All "power transformed" values use the same power parameter `p=1/1.6`.

station `character`. Name of the observation station.

robs `numeric`. Observed total precipitation (power transformed).

year `integer`. Year in which the observation was taken.

day `integer`. Day for which the observation was taken.

tppow_mean, tppow_sprd, tppow_min, tppow_max, tppow_mean0612, tppow_mean1218, tppow_mean1824, tppow_
`numeric`. Predicted total precipitation (power transformed).

capepow_mean, capepow_sprd, capepow_min, capepow_max, capepow_mean0612, capepow_mean1218, capepow_m
`numeric`. Predicted convective available potential energy (power transformed).

dswrf_mean_mean, dswrf_mean_min, dswrf_mean_max, dswrf_sprd_mean, dswrf_sprd_min, dswrf_sprd_max `numeric`. Predicted downwards shortwave radiation flux ("sunshine").

msl_diff, msl_mean_mean, msl_mean_min, msl_mean_max, msl_sprd_mean, msl_sprd_min, msl_sprd_max `numeric`. Predicted mean sea level pressure.

pwat_mean_mean, pwat_mean_min, pwat_mean_max, pwat_sprd_mean, pwat_sprd_min, pwat_sprd_max `numeric`. Predicted precipitable water.

tcolc_mean_mean, tcolc_mean_min, tcolc_mean_max, tcolc_sprd_mean, tcolc_sprd_min, tcolc_sprd_max `numeric`. Predicted total column-integrated condensate.

tmax_mean_mean, tmax_mean_min, tmax_mean_max, tmax_sprd_mean, tmax_sprd_min, tmax_sprd_max `numeric`. Predicted 2m maximum temperature.

t500_mean_mean, t500_mean_min, t500_mean_max, t500_sprd_mean, t500_sprd_min, t500_sprd_max `numeric`. Predicted temperature on 500 hPa.

t700_mean_mean, t700_mean_min, t700_mean_max, t700_sprd_mean, t700_sprd_min, t700_sprd_max `numeric`. Predicted temperature on 700 hPa.

t850_mean_mean, t850_mean_min, t850_mean_max, t850_sprd_mean, t850_sprd_min, t850_sprd_max `numeric`. Predicted temperature on 850 hPa.

tdiff500850_mean, tdiff500850_min, tdiff500850_max `numeric`. Predicted temperature difference 500 hPa to 850 hPa.

tdiff700850_mean, tdiff700850_min, tdiff700850_max `numeric`. Predicted temperature difference 700 hPa to 850 hPa.

tdiff500700_mean, tdiff500700_min, tdiff500700_max `numeric`. Predicted temperature difference 500 hPa to 700 hPa.

Details

These observation sites are maintained by the hydrographical service Tyrol and provide daily precipitation sums reported at 06~UTC. Before published, the observations have been quality-controlled by the maintainer.

The forecast data is based on the second-generation global ensemble reforecast dataset and consists of range of different meteorological quantities for day one (forecast horizon +6 to +30 hours ahead). The forecasts have been bi-linearly interpolated to the station location.

References

Hamill T M, Bates G T, Whitaker J S, Murray D R, Fiorino M, Galarneau Jr. T J, Zhu Y, Lapenta W (2013). NOAA's Second-Generation Global Medium-Range Ensemble Reforecast Dataset. *Bulletin of the American Meteorological Society*, **94**(10), 1553–1565. doi:10.1175/BAMSD1200014.1

BMLFUW (2016). Bundesministerium f\"ur Land und Forstwirtschaft, Umwelt und Wasserwirtschaft (BMLFUW), Abteilung IV/4 – Wasserhaushalt. Available at http://ehyd.gv.at. Accessed: 2016–02–29.

Examples

```
data("RainTyrol", package = "RainTyrol")
head(RainTyrol)
colnames(RainTyrol)
```

`StationsTyrol` *Observation stations*

Description

All 95 observations stations including all necessary information about each station.

Usage

```
data("StationsTyrol")
```

Format

A `data.frame` containing 95 observation stations and 5 variables.

name character. Stationname.

id numeric. Stationnumber

lon numeric. Longitutde.

lat numeric. Latitude.

alt numeric. Altitude.

References

Bundesministerium fuer Land und Forstwirtschaft, Umwelt und Wasserwirtschaft (BMLFUW), Abteilung IV/4 - Wasserhaushalt (2016). Available at http://ehyd.gv.at, Accessed: February 29 2016

Examples

```
data("StationsTyrol", package = "RainTyrol")
head(StationsTyrol)
```

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