

Package: RainTyrol (via r-universe)

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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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Contents

evalmodels	2
MapTyrol	3
RainTyrol	4
StationsTyrol	6
Index	7

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

<code>station</code>	character, name of the selected observation station.
<code>train</code>	numeric, (vector of) years the models should be trained on (available: 1985–2012)
<code>test</code>	numeric, (vector of) years the models should be tested on (available: 1985–2012)
<code>ntree</code>	numeric, number of trees in the distributional forest.
<code>distfamily</code>	character, name of the distribution that should be used, can be either a gaussian or a logistic distribution.
<code>tree_minsplit</code>	numeric, the minimum sum of weights in a node in order to be considered for splitting in the distributional tree.
<code>tree_mincrit</code>	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.
<code>tree_minbucket</code>	numeric, the minimum sum of weights in a terminal node in the distributional tree.
<code>forest_minsplit</code>	numeric, the minimum sum of weights in a node in order to be considered for splitting in the distributional forest.
<code>forest_minbucket</code>	numeric, the minimum sum of weights in a terminal node in the distributional forest.
<code>forest_mincrit</code>	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 (continuous 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_max0612, tppow_max1218, tppow_max1824 numeric. Predicted total precipitation (power transformed).

capepow_mean, capepow_sprd, capepow_min, capepow_max, capepow_mean0612, capepow_mean1218, capepow_max0612, capepow_max1218, capepow_max1824 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.

tcoll_mean_mean, tcoll_mean_min, tcoll_mean_max, tcoll_sprd_mean, tcoll_sprd_min, tcoll_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	<i>Observation stations</i>
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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)
```

Index

* datasets

MapTyrol, [3](#)

RainTyrol, [4](#)

StationsTyrol, [6](#)

crch, [2](#)

cvrisk, [3](#)

distforest, [2](#)

disttree, [2](#)

evalmodels, [2](#)

gamboostLSS, [2](#)

gamlss, [2](#)

MapTyrol, [3](#)

RainTyrol, [4](#)

StationsTyrol, [6](#)