

Package ‘STCCGEV’

May 7, 2026

Title Conditional Copula Model for Crop Yield Forecasting

Version 1.0.0

Description Provides functions to model and forecast crop yields using a spatial temporal conditional copula approach.
The package incorporates extreme weather covariates and Bayesian Structural Time Series models to analyze crop yield dependencies across multiple regions. Includes tools for fitting, simulating, and visualizing results.
This method build upon established R packages, including 'Hofert' 'et' 'al'. (2025) <[doi:10.32614/CRAN.package.copula](https://doi.org/10.32614/CRAN.package.copula)>, 'Scott' (2024) <[doi:10.32614/CRAN.package.bsts](https://doi.org/10.32614/CRAN.package.bsts)>, and 'Stephenson' 'et' 'al'. (2024) <[doi:10.32614/CRAN.package.evd](https://doi.org/10.32614/CRAN.package.evd)>.

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Encoding UTF-8

RoxygenNote 7.3.2

Imports bsts, copula, evd, ggplot2, grDevices, rootSolve, stats, utils

Depends R (>= 4.0.0)

LazyData true

LazyDataCompression xz

Suggests knitr, rmarkdown, testthat (>= 3.0.0),

VignetteBuilder knitr

Config/testthat/edition 3

NeedsCompilation no

Author Marie Michaelides [aut],
Mélina Mailhot [aut],
Yongkun Li [aut, cre]

Maintainer Yongkun Li <yongkun.li@concordia.ca>

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| | |
|---------------|--|
| clayton.theta | <i>Compute Clayton Copula Parameter from Kendall's Tau</i> |
|---------------|--|

Description

Computes the Clayton copula dependence parameter based on Kendall's tau.

Usage

```
clayton.theta(tau)
```

Arguments

tau Numeric, Kendall's tau correlation coefficient.

Value

Numeric, estimated Clayton copula parameter.

| | |
|-------------|-------------------------------|
| copula_list | <i>Supported copula types</i> |
|-------------|-------------------------------|

Description

A list containing supported copula types.

Usage

```
copula_list
```

Format

A list of copula types.

copulas "Gaussian" "Clayton" "Frank" "Gumbel" "Joe"

crophyields_covariates *Data of the article "Probabilistic Crop Yields Forecasts With Spatio-Temporal Conditional Copula Using Extreme Weather Covariates"*

Description

Contains crop yields and climate indices data of 24 CD regions in Ontario from 1950 to 2022

Usage

crophyields_covariates

Format

A data frame with 1752 rows and 38 variables:

time chr: year from 1950-2022

CAR_CODE num: 1-4

CAR chr: Southern, Western, Central, Eastern Ontario

CD_CODE num

CD chr: 24 subregions

ID chr

lat num: latitude

lon num: longitude

yield num: wheat crop yield per census division, in bushel/acre

cdd num: Annual maximum number of consecutive days with daily precipitation below 1mm (unit = days)

cddcold_18 num: Annual cooling degree days above 18C (unit = degree_days)

dlyfrzthw_tx0_tn num: Annual number of days with a diurnal freeze-thaw cycle : tmax > 0 degc and tmin <= -1 degc

first_fall_frost num: First day of year with temperature below 0 degc for at least 1 days

frost_days num: Annual number of days with minimum daily temperature below 0C

ice_days num: Annual number of days with maximum daily temperature below 0 degC

nr_cdd num: The annual number of dry periods of 6 days and more, during which the maximal precipitation on a window of 6 days is under 1.0 mm

preptot num: Annual total precipitation (unit = mm)

r1mm num: Annual number of days with daily precipitation over 1.0 mm/day

r10mm num: Annual number of days with daily precipitation over 10.0 mm/day

r20mm num: Annual number of days with daily precipitation over 20.0 mm/day

rx1day num: Annual maximum 1-day total precipitation (unit = mm)

rx5day num: Annual maximum 5-day total precipitation (unit = mm)

tg_mean num: Annual mean of daily mean temperatures (unit = C degrees)
tn_mean num: Annual mean of daily minimum temperatures (unit = C degrees)
tn_min num: Annual minimum of daily minimum temperatures (unit = C degrees)
tnlt_-15 num: Annual number of days where daily minimum temperature is below -15 degC
tnlt_-25 num: Annual number of days where daily minimum temperature is below -25 degC
tr_18 num: Annual number of tropical nights : defined as days with minimum daily temperature above 18 degc
tr_20 num: Annual number of tropical nights : defined as days with minimum daily temperature above 20 degc
tr_22 num: Annual number of tropical nights : defined as days with minimum daily temperature above 22 degc
tx_max num: Annual minimum of daily maximum temperature (unit = C degrees)
tx_mean num: Annual mean of daily maximum temperature (unit = C degrees)
txgt_25 num: Annual number of days where daily maximum temperature exceeds 25 degC
txgt_27 num: Annual number of days where daily maximum temperature exceeds 27 degC
txgt_29 num: Annual number of days where daily maximum temperature exceeds 29 degC
txgt_30 num: Annual number of days where daily maximum temperature exceeds 30 degC
txgt_32 num: Annual number of days where daily maximum temperature exceeds 32 degC

Source

ClimateData.ca

dynamic.rho

Compute Dynamic Gaussian Copula Correlation Parameter (rho)

Description

Computes the time-varying correlation parameter (rho) for a Gaussian copula.

Usage

```
dynamic.rho(params, lagged_rho, X_t)
```

Arguments

| | |
|------------|---|
| params | Numeric vector of parameters: omega, alpha, and gamma coefficients. |
| lagged_rho | Numeric, the previous rho value. |
| X_t | Numeric vector or matrix of covariates at time t. |

Value

Numeric, estimated dynamic Gaussian copula correlation.

dynamic.theta.clayton *Compute Dynamic Clayton Copula Parameter*

Description

Computes the Clayton copula parameter dynamically based on lagged values and covariates.

Usage

```
dynamic.theta.clayton(params, lagged_theta, X_t)
```

Arguments

| | |
|--------------|---|
| params | Numeric vector of parameters: omega, alpha, and gamma coefficients. |
| lagged_theta | Numeric, the previous theta value. |
| X_t | Numeric vector or matrix of covariates at time t. |

Value

Numeric, estimated dynamic Clayton copula parameter.

dynamic.theta.frank *Compute Dynamic Frank Copula Parameter*

Description

Computes the Frank copula parameter dynamically based on lagged values and covariates.

Usage

```
dynamic.theta.frank(params, lagged_theta, X_t)
```

Arguments

| | |
|--------------|---|
| params | Numeric vector of parameters: omega, alpha, and gamma coefficients. |
| lagged_theta | Numeric, the previous theta value. |
| X_t | Numeric vector or matrix of covariates at time t. |

Value

Numeric, estimated dynamic Frank copula parameter.

dynamic.theta.gumbel *Compute Dynamic Gumbel Copula Parameter*

Description

Computes the Gumbel copula parameter dynamically based on lagged values and covariates.

Usage

```
dynamic.theta.gumbel(params, lagged_theta, X_t)
```

Arguments

| | |
|--------------|---|
| params | Numeric vector of parameters: omega, alpha, and gamma coefficients. |
| lagged_theta | Numeric, the previous theta value. |
| X_t | Numeric vector or matrix of covariates at time t. |

Value

Numeric, estimated dynamic Gumbel copula parameter.

dynamic.theta.joe *Compute Dynamic Joe Copula Parameter*

Description

Computes the Joe copula parameter dynamically based on lagged values and covariates.

Usage

```
dynamic.theta.joe(params, lagged_theta, X_t)
```

Arguments

| | |
|--------------|---|
| params | Numeric vector of parameters: omega, alpha, and gamma coefficients. |
| lagged_theta | Numeric, the previous theta value. |
| X_t | Numeric vector or matrix of covariates at time t. |

Value

Numeric, estimated dynamic Joe copula parameter.

`fit_bsts`*Fit a Bayesian Structural Time Series (BSTS) Model*

Description

Fits a BSTS model for a time series y , given a vector or matrix of covariates z .

Usage

```
fit_bsts(y, z, lags = 0, MCMC.iter = 5000)
```

Arguments

| | |
|------------------------|---|
| <code>y</code> | A numeric vector (time series response variable). |
| <code>z</code> | A numeric vector or matrix (covariates). |
| <code>lags</code> | Integer, number of lags for the autoregressive component. |
| <code>MCMC.iter</code> | Integer, number of MCMC iterations. |

Value

A fitted BSTS model.

`frank.theta`*Compute Frank Copula Parameter from Kendall's Tau*

Description

Computes the Frank copula dependence parameter based on Kendall's tau.

Usage

```
frank.theta(tau)
```

Arguments

| | |
|------------------|---|
| <code>tau</code> | Numeric, Kendall's tau correlation coefficient. |
|------------------|---|

Value

Numeric, estimated Frank copula parameter.

| | |
|----------|---|
| GH.theta | <i>Compute Gumbel Copula Parameter from Kendall's Tau</i> |
|----------|---|

Description

Computes the Gumbel-Hougaard copula dependence parameter based on Kendall's tau.

Usage

```
GH.theta(tau)
```

Arguments

tau Numeric, Kendall's tau correlation coefficient.

Value

Numeric, estimated Gumbel copula parameter.

| | |
|------------------|--|
| init_params_full | <i>Initial Parameters for 2D Pseudo-Loglikelihood Estimation</i> |
|------------------|--|

Description

Initial Parameters for 2D Pseudo-Loglikelihood Estimation

Usage

```
init_params_full
```

Format

A numeric vector of length $(2 + M + 4 * D * M)$ where:

omega Baseline autoregressive coefficient.

alpha Parameter controlling variance.

gamma1, gamma2, gamma3 Coefficients related to external factors.

phi_gev AR(1) coefficient for GEV.

sigma_mu Std dev of innovations for AR(1) process for GEV.

sigma_gev GEV scale parameter for GEV.

xi_gev GEV shape parameter for GEV.

| | |
|--------------------|--|
| init_params_full_G | <i>Initial Parameters for 2D Pseudo-Loglikelihood-Generalized Estimation</i> |
|--------------------|--|

Description

Initial Parameters for 2D Pseudo-Loglikelihood-Generalized Estimation

Usage

init_params_full_G

Format

A numeric vector of length $(2 + M + 4 * D * M)$, structured as follows:

omega Baseline autoregressive coefficient.

alpha Parameter controlling variance.

gamma1, gamma2, gamma3 Coefficients related to external factors.

Climate variable parameters For each climate variable in each region, the following parameters are included:

- mean(z), sd(z), sd(z), xi_gev for each region and variable.

| | |
|-------------------|--|
| init_params_noGEV | <i>Initial Parameters for 2D Pseudo-Loglikelihood Estimation without GEV models for covariates</i> |
|-------------------|--|

Description

Initial Parameters for 2D Pseudo-Loglikelihood Estimation without GEV models for covariates

Usage

init_params_noGEV

Format

A numeric vector of length $(2 + M)$ where:

omega Baseline autoregressive coefficient.

alpha Parameter controlling variance.

gamma1, gamma2, gamma3 Coefficients related to external factors.

joe.theta

Compute Joe Copula Parameter from Kendall's Tau

Description

Computes the Joe copula dependence parameter based on Kendall's tau.

Usage

```
joe.theta(tau)
```

Arguments

tau Numeric, Kendall's tau correlation coefficient.

Value

Numeric, estimated Joe copula parameter.

log_likelihood_Generalized

Compute Log-Likelihood for a Generalized Dynamic Copula-GEV Model

Description

Computes the log-likelihood for a time-varying copula model combined with Generalized Extreme Value (GEV) margins.

Usage

```
log_likelihood_Generalized(params, U, Z, X, copula)
```

Arguments

params Numeric vector of model parameters, including copula parameters (omega, alpha, gamma) and GEV distribution parameters.

U Numeric matrix (n_train x D), pseudo-observations for the copula.

Z Numeric array (n_train x D x M), observed data for each margin and sub-feature.

X Numeric matrix (n_train x M), risk factors for the dynamic copula parameter.

copula Character, specifying the copula type: "Clayton", "Frank", "Gumbel", "Joe", or "Gaussian".

Value

Numeric, negative log-likelihood value.

Examples

```
test_ll <- log_likelihood_Generalized(init_params_full_G,uu,
                                     zz_train,xx_train,"Gaussian")
```

log_likelihood_generalized_2d

Generalized Log-Likelihood Function for 2D Copula-GEV Model

Description

Computes the negative log-likelihood of a 2-dimensional copula-GEV model, incorporating dynamic Generalized Extreme Value (GEV) parameters and a time-varying copula structure.

Usage

```
log_likelihood_generalized_2d(params, u1, u2, X_t, z1, z2, copula)
```

Arguments

| | |
|--------|--|
| params | Numeric vector, model parameters including copula and GEV parameters. |
| u1 | Numeric vector (length n_train), pseudo-observations for margin 1. |
| u2 | Numeric vector (length n_train), pseudo-observations for margin 2. |
| X_t | Numeric matrix (n_train x M), risk factors affecting copula parameters. |
| z1 | Numeric matrix (n_train x M), observed data for margin 1. |
| z2 | Numeric matrix (n_train x M), observed data for margin 2. |
| copula | Character, specifying the copula type: "Clayton", "Frank", "Gumbel", "Joe", or "Gaussian". |

Value

The negative log-likelihood value for optimization.

Examples

```
test_ll_2d <-log_likelihood_generalized_2d(init_params_full,
                                          uu[,1],
                                          uu[,2],
                                          xx_train,
                                          zz_train[,1,],
                                          zz_train[,2,],
                                          "Gaussian")
```

log_likelihood_noGEV *Compute Log-Likelihood for a Generalized Dynamic Copula Model without GEV covariates*

Description

Computes the log-likelihood for a time-varying copula model.

Usage

```
log_likelihood_noGEV(params, U, Z, X, copula)
```

Arguments

| | |
|--------|--|
| params | Numeric vector of model parameters, including copula parameters (omega, alpha, gamma). |
| U | Numeric matrix (n_train x D), pseudo-observations for the copula. |
| Z | Numeric array (n_train x D x M), observed data for each margin and sub-feature. |
| X | Numeric matrix (n_train x M), risk factors for the dynamic copula parameter. |
| copula | Character, specifying the copula type: "Clayton", "Frank", "Gumbel", "Joe", or "Gaussian". |

Value

Numeric, negative log-likelihood value.

Examples

```
test_ll_noGEV <- log_likelihood_noGEV(init_params_noGEV,uu,
  zz_train,x_train,"Gaussian")
```

medoid_names *list containing Dufferin and Wellington*

Description

list containing Dufferin and Wellington

Usage

```
medoid_names
```

Format

An object of class list of length 2.

| | |
|--------|----|
| n_test | 19 |
|--------|----|

Description

19

Usage

n_test

Format

An object of class integer of length 1.

| | |
|---------|----|
| n_train | 54 |
|---------|----|

Description

54

Usage

n_train

Format

An object of class integer of length 1.

| | |
|---------------|---|
| plot_forecast | <i>Plot Observed Data and BSTS Forecast</i> |
|---------------|---|

Description

Creates a plot of observed data, forecasted values, and confidence intervals.

Usage

```
plot_forecast(  
  forecast,  
  data_train,  
  data_test,  
  time,  
  quant_high,  
  quant_low,  
  observed_col,  
  forecast_col,  
  title  
)
```

Arguments

| | |
|--------------|--|
| forecast | A matrix of BSTS forecast samples. |
| data_train | Numeric vector, training data. |
| data_test | Numeric vector, test data. |
| time | Numeric vector, representing time indices. |
| quant_high | Numeric, upper quantile for confidence interval. |
| quant_low | Numeric, lower quantile for confidence interval. |
| observed_col | Character, color for observed data. |
| forecast_col | Character, color for forecasted data. |
| title | Character, title of the plot. |

Value

A ggplot2 object.

plot_forecast_compare *Compare Forecasts from Two Models*

Description

Generates a time series plot comparing the forecasts from two models along with observed data.

Usage

```
plot_forecast_compare(  
  forecast1,  
  forecast2,  
  data_train,  
  data_test,  
  time,
```

```

    quant_high,
    quant_low,
    col1,
    title
  )

```

Arguments

| | |
|------------|---|
| forecast1 | Numeric matrix, forecasted values from the first model (columns: time points). |
| forecast2 | Numeric matrix, forecasted values from the second model (columns: time points). |
| data_train | Numeric vector, training data used for modeling. |
| data_test | Numeric vector, actual test data for evaluation. |
| time | Numeric vector, representing the time points corresponding to the data. |
| quant_high | Numeric, upper quantile (e.g., 0.9) for confidence interval. |
| quant_low | Numeric, lower quantile (e.g., 0.1) for confidence interval. |
| col1 | Character, color for observed data lines. |
| title | Character, title for the plot. |

Value

A ggplot2 object showing the forecast comparison.

| | |
|-----------------|---|
| simul.fun.noGEV | <i>Simulate Multivariate Crop Yield Data Using a Generalized Copula-BSTS Model Without GEV Covariates</i> |
|-----------------|---|

Description

This function simulates multivariate crop yield data using a time-varying copula combined with Bayesian Structural Time Series (BSTS) models without GEV covariates for comparison.

Usage

```

simul.fun.noGEV(
  nsim = 100,
  n_train,
  n_test,
  copula,
  init_params,
  fn,
  U_train,
  Z_train,
  Z_test,
  X_train,
  X_test,
  Y_test,
  BSTS_list
)

```

Arguments

| | |
|-------------|--|
| nsim | Integer, number of simulation replications. |
| n_train | Integer, number of training observations. |
| n_test | Integer, number of test observations. |
| copula | Character, specifying the copula type: "Clayton", "Frank", "Gumbel", "Joe", or "Gaussian". |
| init_params | Numeric vector, initial parameter values for optimization. |
| fn | Function, log-likelihood function for parameter estimation. |
| U_train | Numeric matrix (n_train x D), pseudo-observations for the copula. |
| Z_train | Numeric array (n_train x D x M), observed data for each margin and sub-feature. |
| Z_test | Numeric array (n_test x D x M), observed data for each margin and sub-feature. |
| X_train | Numeric matrix (n_train x M), risk factors for the dynamic copula parameter. |
| X_test | Numeric matrix (n_test x M), risk factors for the dynamic copula parameter. |
| Y_test | Numeric matrix (n_test x D), true future values for MSE calculation. |
| BSTS_list | List of length D, each element is a BSTS model for a different margin. |

Value

A list containing:

| | |
|---------------|--|
| optim_results | Results from the optimization process. |
| theta_sim | Simulated copula parameters across replications. |
| Y_sim | Simulated final BSTS-based forecasts. |
| MSE | Mean squared error for each simulation run. |

simulation_generalized

Simulate Multivariate Crop Yield Data Using a Generalized Copula-GEV-BSTS Model

Description

This function simulates multivariate crop yield data using a time-varying copula combined with Generalized Extreme Value (GEV) margins and Bayesian Structural Time Series (BSTS) models.

Usage

```
simulation_generalized(
  nsim = 100,
  n_train,
  n_test,
  copula,
  init_params,
  fn,
  U_train,
  Z_train,
  X,
  Y_test,
  BSTS_list
)
```

Arguments

| | |
|--------------------------|--|
| <code>nsim</code> | Integer, number of simulation replications. |
| <code>n_train</code> | Integer, number of training observations. |
| <code>n_test</code> | Integer, number of test observations. |
| <code>copula</code> | Character, specifying the copula type: "Clayton", "Frank", "Gumbel", "Joe", or "Gaussian". |
| <code>init_params</code> | Numeric vector, initial parameter values for optimization. |
| <code>fn</code> | Function, log-likelihood function for parameter estimation. |
| <code>U_train</code> | Numeric matrix ($n_{\text{train}} \times D$), pseudo-observations for the copula. |
| <code>Z_train</code> | Numeric array ($n_{\text{train}} \times D \times M$), observed data for each margin and sub-feature. |
| <code>X</code> | Numeric matrix ($n_{\text{train}} \times M$), risk factors for the dynamic copula parameter. |
| <code>Y_test</code> | Numeric matrix ($n_{\text{test}} \times D$), true future values for MSE calculation. |
| <code>BSTS_list</code> | List of length D , each element is a BSTS model for a different margin. |

Value

A list containing:

| | |
|----------------------------|--|
| <code>optim_results</code> | Results from the optimization process. |
| <code>theta_sim</code> | Simulated copula parameters across replications. |
| <code>Y_sim</code> | Simulated final BSTS-based forecasts. |
| <code>MSE</code> | Mean squared error for each simulation run. |

 simul_fun_generalized_2d

A Special Case of simulation_generalized in 2 Dimensions

Description

A Special Case of simulation_generalized in 2 Dimensions

Usage

```
simul_fun_generalized_2d(
  nsim,
  n_train,
  n_test,
  copula,
  init_params,
  fn,
  u1,
  u2,
  z1_train,
  z2_train,
  X_t,
  y1_test,
  y2_test,
  BSTS_1,
  BSTS_2
)
```

Arguments

| | |
|-------------|--|
| nsim | Integer, number of simulation replications. |
| n_train | Integer, number of training observations. |
| n_test | Integer, number of test observations. |
| copula | Character, specifying the copula type: "Clayton", "Frank", "Gumbel", "Joe", or "Gaussian". |
| init_params | Numeric vector, initial parameter values for optimization. |
| fn | Function, log-likelihood function for parameter estimation. |
| u1 | Numeric vector (n_train), first pseudo-observation for the copula. |
| u2 | Numeric vector (n_train), second pseudo-observation for the copula. |
| z1_train | Numeric matrix (n_train x M), observed data for the first margin. |
| z2_train | Numeric matrix (n_train x M), observed data for the second margin. |
| X_t | Numeric matrix (n_train x M), risk factors for the dynamic copula parameter. |
| y1_test | Numeric vector (n_test), true future values for the first response variable. |

| | |
|----------------------|--|
| <code>y2_test</code> | Numeric vector (<code>n_test</code>), true future values for the second response variable. |
| <code>BSTS_1</code> | Fitted BSTS model for the first response variable. |
| <code>BSTS_2</code> | Fitted BSTS model for the second response variable. |

Value

A list containing:

| | |
|------------------------------|--|
| <code>theta_simulated</code> | Simulated copula parameters across replications. |
| <code>y1_simulated</code> | Simulated values for the first response variable. |
| <code>y2_simulated</code> | Simulated values for the second response variable. |
| <code>MSE</code> | Mean squared error for each simulation run. |
| <code>optim_results</code> | Results from the optimization process. |

| | |
|-----------------------|------------------|
| <code>time_all</code> | <i>1950-2022</i> |
|-----------------------|------------------|

Description

1950-2022

Usage

`time_all`

Format

An object of class character of length 73.

| | |
|------------------------|------------------|
| <code>time_test</code> | <i>2004-2022</i> |
|------------------------|------------------|

Description

2004-2022

Usage

`time_test`

Format

An object of class character of length 19.

| | |
|------------|-----------|
| time_train | 1950-2003 |
|------------|-----------|

Description

1950-2003

Usage

time_train

Format

An object of class character of length 54.

| | |
|----|---|
| uu | <i>Pseudo-Observations of BSTS Residuals for Crop Yield Forecasting</i> |
|----|---|

Description

Pseudo-Observations of BSTS Residuals for Crop Yield Forecasting

Usage

uu

FormatA matrix with dimensions (n_{train}, D) :**n_train** Number of time points used in the training set.**D** Number of regions analyzed (Dufferin, Wellington).**Source**

Derived from residuals of BSTS models fitted to crop yield data.

xx_all

*Maximized Covariates Matrix for Crop Yield Forecasting***Description**

Maximized Covariates Matrix for Crop Yield Forecasting

Usage

xx_all

Format

A three-dimensional array with dimensions $(n_{train} + n_{test}, M)$:

n_train+n_test Number of time points used in the training set.

M Number of selected climate covariates used for modeling (cdd,frost_days,rx1day, tg_mean, txgt_25).

Source

Derived from historical climate data from ClimateData.ca.

xx_test

*Maximized Covariates Matrix for Crop Yield Forecasting***Description**

Maximized Covariates Matrix for Crop Yield Forecasting

Usage

xx_test

Format

A three-dimensional array with dimensions (n_{test}, M) :

n_test Number of time points used in the testing set.

M Number of selected climate covariates used for modeling (cdd,frost_days,rx1day, tg_mean, txgt_25).

Source

Derived from historical climate data from ClimateData.ca.

xx_train

*Maximized Covariates Matrix for Crop Yield Forecasting***Description**

Maximized Covariates Matrix for Crop Yield Forecasting

Usage

xx_train

FormatA three-dimensional array with dimensions (n_{train}, M) :**n_test** Number of time points used in the training set.**M** Number of selected climate covariates used for modeling (cdd, frost_days, rx1day, tg_mean, txgt_25).**Source**

Derived from historical climate data from ClimateData.ca.

yy_all

*Crop Yield Data***Description**

Crop Yield Data

Usage

yy_all

FormatA matrix with dimensions $(n_{train} + n_{test}, D)$:**n_train+n_test** Number of time points used in the test set.**D** Number of regions analyzed (Dufferin, Wellington).**Source**

Historical crop yield records from ClimateData.ca.

 yy_test

Crop Yield Data for Testing in BSTS Models

Description

Crop Yield Data for Testing in BSTS Models

Usage

yy_test

Format

A matrix with dimensions (n_{train}, D) :

n_train Number of time points used in the test set.

D Number of regions analyzed (Dufferin, Wellington).

Source

Historical crop yield records from ClimateData.ca.

 yy_train

Crop Yield Data for Training in BSTS Models

Description

Crop Yield Data for Training in BSTS Models

Usage

yy_train

Format

A matrix with dimensions (n_{test}, D) :

n_test Number of time points used in the train set.

D Number of regions analyzed (Dufferin, Wellington).

Source

Historical crop yield records from ClimateData.ca.

| | |
|--------|---|
| zz_all | <i>Standardized Covariates Array for Crop Yield Forecasting</i> |
|--------|---|

Description

Standardized Covariates Array for Crop Yield Forecasting

Usage

zz_all

Format

A three-dimensional array with dimensions $(n_{train} + n_{test}, D, M)$:

n_train+n_test Number of time points used in the training set.

D Number of regions analyzed (Dufferin, Wellington).

M Number of selected climate covariates used for modeling (cdd, frost_days, rx1day, tg_mean, txgt_25).

Source

Derived from historical climate data.

| | |
|---------|---|
| zz_test | <i>Standardized Covariates Array for Crop Yield Forecasting</i> |
|---------|---|

Description

Standardized Covariates Array for Crop Yield Forecasting

Usage

zz_test

Format

A three-dimensional array with dimensions (n_{test}, D, M) :

n_test Number of time points used in the testing set.

D Number of regions analyzed (Dufferin, Wellington).

M Number of selected climate covariates used for modeling (cdd, frost_days, rx1day, tg_mean, txgt_25).

Source

Derived from historical climate data.

`zz_train`*Standardized Covariates Array for Crop Yield Forecasting*

Description

Standardized Covariates Array for Crop Yield Forecasting

Usage`zz_train`**Format**

A three-dimensional array with dimensions (n_{train}, D, M) :

n_test Number of time points used in the training set.

D Number of regions analyzed (Dufferin, Wellington).

M Number of selected climate covariates used for modeling (cdd, frost_days, rx1day, tg_mean, txgt_25).

Source

Derived from historical climate data from ClimateData.ca.

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