Package 'ConsensusCPA'

August 24, 2026

Type Package

Title Consensus-Based Change-Point Analysis Using Multiple Statistical Tests

Version 0.1.0

Maintainer S. Vishnu Shankar <S.vishnushankar55@gmail.com>

Description Provides a unified framework for detecting change points in univariate time series using multiple statistical methods, including Pettitt's test, Buishand Range test, Buishand U test, and the Standard Normal Homogeneity Test (SNHT). The package summarizes individual test results, determines a consensus change point using majority, median, or weighted agreement approaches, exports results with graphical comparisons of observations for before and after the detected change point. The methodology is further described in Laasya et al. (2026) <doi:10.1007/s11069-025-07783-2>.

License GPL-3

Encoding UTF-8

Depends R (>= 4.1.0)

Imports dplyr, ggplot2, rlang, trend, openxlsx, zoo

Config/roxygen2/version 8.1.0

NeedsCompilation no

Author S. Vishnu Shankar [aut, cre],
Santosha Rathod [aut],
Mrinmoy Ray [aut],
Anil Kumar [aut],
V. Lavanya [aut],
Prabhat Kumar [aut]

Repository CRAN

Date/Publication 2026-08-24 14:50:13 UTC

Contents

ConsensusCPA *Consensus-Based Change-Point Analysis*

Description

Provides a unified framework for detecting change points in univariate time series using multiple statistical methods, including Pettitt's test, Buishand Range test, Buishand U test, and the Standard Normal Homogeneity Test (SNHT). The package summarizes individual test results, determines a consensus change point using majority, median, or weighted agreement approaches, exports results with graphical comparisons of observations for before and after the detected change point.

Usage

```
ConsensusCPA(
  Data,
  methods = c("Pettitt", "Buishand_Range", "Buishand_U", "SNHT"),
  consensus = c("Majority", "Median", "Weighted"),
  missing = c("omit", "mean", "median", "linear"),
  min_n = 10,
  verbose = TRUE,
  export_excel = FALSE,
  excel_file = NULL,
  save_plot = FALSE,
  plot_file = NULL
)
```

Arguments

Data	A data frame or matrix where the first column contains the time variable (e.g., Year) and the remaining columns contain the time series for different variables or districts.
methods	Character vector specifying the change-point detection methods to apply. Available options are "Pettitt", "Buishand_Range", "Buishand_U", and "SNHT".
consensus	Character string specifying the consensus approach. Options are "Majority", "Median", and "Weighted".
missing	Character string specifying the method for handling missing values. Options are "omit", "mean", "median", and "linear".
min_n	Minimum number of observations required for analysis.
verbose	Logical; if TRUE, prints progress messages and displays the final results.
export_excel	Logical. If TRUE, exports results to an Excel file.
excel_file	Name of the Excel output file.
save_plot	Logical. If TRUE, saves the plot as a PNG image.
plot_file	Character string specifying the path of the output PNG image. Required only when save_plot = TRUE.

Value

A list containing:

- `Results` A data frame containing change-point estimates, test statistics, p-values, agreement measures, and consensus year.
- `Plot` A ggplot object showing the mean values before and after the consensus change point.

References

Laasya, K. N. V. L., Kallakuri, S., Rathod, S., Neelima, T. L., Chakraborty, D., Shankar, S. V., Ray, M., Paul, N. C., Saleem, S., Kumar, A. T., Bandumula, N., Baral, K., Reddy, K. S., and Kumar, A. (2026). Statistical investigation of heatwave trends and change points in Telangana, India. doi:10.1007/s11069-025-07783-2

Examples

```
data <- data.frame(
  Year = 2001:2020,
  District_A = c(10, 11, 10, 12, 13, 12, 14, 15, 16, 15,
                 18, 19, 20, 21, 20, 22, 23, 24, 25, 26),
  District_B = c(8, 9, 10, 9, 11, 12, 11, 13, 14, 15,
                 16, 15, 17, 18, 19, 20, 21, 22, 23, 24)
)

result <- ConsensusCPA(data)
result
```

Index