Package 'trendchange'

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Type Package

Title Innovative Trend Analysis and Time-Series Change Point Analysis

Version 1.1

Maintainer Sandeep Kumar Patakamuri <sandeep.patakamuri@gmail.com>

Description Innovative Trend Analysis is a graphical method to examine the trends in time series data. Sequential Mann-Kendall test uses the intersection of prograde and retrograde series to indicate the possible change point in time series data. Distribution free cumulative sum charts indicate location and significance of the change point in time series.
Zekai, S. (2011). <doi:10.1061/(ASCE)HE.1943-5584.0000556>.
Grayson, R. B. et al. (1996). Hydrological Recipes: Estimation Techniques in Australian Hydrology. Cooperative Research Centre for Catchment Hydrology, Australia, p. 125.
Sneyers, S. (1990). On the statistical analysis of series of observations. Technical note no 5 143, WMO No 725 415. Secretariat of the World Meteorological Organization, Geneva, 192 pp.

License GPL-3

Encoding UTF-8

LazyData true

RoxygenNote 6.1.1

Suggests testthat, knitr, rmarkdown,covr

NeedsCompilation no

Author Sandeep Kumar Patakamuri [aut, cre],
Bappa Das [aut, ctb]

Repository CRAN

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R topics documented:

dfcusum *Distribution Free CUSUM Test*

Description

Distribution free CUSUM test is used to identify the change point in a series of data.

Usage

```
dfcusum(x,startyear)
```

Arguments

x	- Time series data vector
startyear	- Starting of the time series (year!)

Details

The point at which Maximum value of cumulative sum occurs, will indicate the change point in the time series. If the maximum value is equal to or greater than the critical value, it indicates significance of the change point.

Value

CUMSUM values - Cumulative sum series

Maximum CUMSUM Value - Absolute Maximum value in cumulative sum series

90 percent CI - Critical value at 90 percent Confidence Interval (1.228*sqrt(n))

95 percent CI - Critical value at 95 percent Confidence Interval (1.36*sqrt(n))

99 percent CI - Critical value at 99 percent Confidence Interval (1.63*sqrt(n))

References

Grayson, R.B., Argent, R.M., Nathan, R.J., McMahon, T.A. and Mein, R., 1996 Hydrological Recipes: Estimation Techniques in Australian Hydrology. Cooperative Research Centre for Catchment Hydrology, Australia, 125 pp.

Examples

```
x<-c(Nile)
dfcusum(x,1871)
```

innovtrend *Innovative Trend Analysis*

Description

Innovative trend analysis method proposed by Zekai Sen (2011) is implemented in this function.

Usage

```
innovtrend(x)
```

Arguments

x	- Time series data vector

Details

If the data points lay on 1:1 line, there is no trend in the data. If the data points exist in the top triangle, it is indicative of positive trend. If the data lies in the bottom triangle, it indicates negative trend in the data.

Value

S - Slope of the trend

D - Trend indicator

CLlower90 - Lower Cofidence Limit at 90 percent CLupper90 - Uppler Cofidence Limit at 90 percent

CLlower95 - Lower Cofidence Limit at 95 percent CLupper95 - Uppler Cofidence Limit at 95 percent

CLlower99 - Lower Cofidence Limit at 99 percent CLupper99 - Uppler Cofidence Limit at 99 percent

References

Şen Z (2011) Innovative Trend Analysis Methodology. J Hydrol Eng 17:1042–1046. <doi: 10.1061/(ASCE)HE.1943-5584.0000556>.

Examples

```
x<-c(Nile)
innovtrend(x)
```

sqmk *Sequential Mann-Kendall Plot*

Description

The series is rearranged based on the ranks of the original series. Prograde and retrograde series plots are generated as per Sneyers (1990). The point where prograde and retrograde series intersect will approximately indicate the possible point of change.

Usage

```
sqmk(x,startyear)
```

Arguments

x	- Time series data vector
startyear	- Starting of the time series (year!)

Details

The point where prograde series and retrograde series intersect, will indicate probable change point in the series. When there is no clear trend in the data, the series will intersect at several locations.

Value

Prograde - Prograde series

Retrograde - Retrograde series

Intersection - True if intersecting and False if not intersecting.

References

Sneyers S (1990) On the statistical analysis of series of observations. Technical note no 5 143, WMO No 725 415 Secretariat of the World Meteorological Organization, Geneva, 192 pp

Examples

```
x<-c(Nile)
sqmk(x,1871)
```

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