Package ‘sazedR’

September 29, 2020

Type Package

Title Parameter-Free Domain-Agnostic Season Length Detection in Time Series

Version 2.0.2

Description Spectral and Average Autocorrelation Zero Distance Density (‘sazed’) is a method for estimating the season length of a seasonal time series. ‘sazed’ is aimed at practitioners, as it employs only domain-agnostic preprocessing and does not depend on parameter tuning or empirical constants. The computation of ‘sazed’ relies on the efficient autocorrelation computation methods suggested by Thibauld Nion (2012, URL: <https://etudes.tibonihoo.net/literate_musing/autocorrelations.html>) and by Bob Carpenter (2012, URL: <https://lingpipe-blog.com/2012/06/08/autocorrelation-fft-kiss-eigen/>).

License GPL-2

URL https://github.com/mtoller/autocorr_season_length_detection/

Encoding UTF-8

LazyData true

Imports bspec (>= 1.5), dplyr (>= 0.8.0.1), fftwtools (>= 0.9.8), pracma (>= 2.1.4), zoo (>= 1.8-3)

RoxygenNote 6.1.1

NeedsCompilation no

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Repository CRAN

Date/Publication 2020-09-29 18:30:02 UTC

R topics documented:

aze .................................
Compute the AZE component of the SAZED ensemble

Description
aze estimates the season length of its argument from the mean autocorrelation zero distance

Usage
aze(y, preprocess = T)

Arguments
y The input time series.
preprocess If true, y is detrended and z-normalized before computation.

Value
The AZE season length estimate of y.

Examples
season_length <- 26
y <- sin(1:400*2*pi/season_length)
aze(y)
aze(y, preprocess = FALSE)
**azed**

*Compute the AZED component of the SAZED ensemble*

**Description**

azed computes the autocorrelation of its argument, and then derives the season length from its the autocorrelations zero density.

**Usage**

azed(y, preprocess = T)

**Arguments**

- **y** The input time series.
- **preprocess** If true, y is detrended and z-normalized before computation.

**Value**

The AZED season length estimate of y.

**Examples**

```r
season_length <- 26
y <- sin(1:400*2*pi/season_length)
azed(y)
azed(y, preprocess = FALSE)
```

---

**computeAcf**

*Compute and shorten autocorrelation*

**Description**

computeAcf computes the autocorrelation function of its argument and discards the zero lag and all lags greater than 2/3 of the argument’s length.

**Usage**

computeAcf(y)

**Arguments**

- **y** The input time series.

**Value**

The shortened autocorrelation


Examples

```r
season_length <- 26
y <- sin(1:400*2*pi/season_length)
computeAcf(y)
```

downsample

**Downsample Time Series**

**Description**

downsample samples down a time series with a rolling mean.

**Usage**

downsample(data, window_size = 2)

**Arguments**

data

The input time series.

window_size

The size of the rolling mean window used.

**Value**

The downsampled time series.

preprocessTs

**Preprocess Time Series for SAZED ensemble**

**Description**

preprocessTs detrends and z-normalizes its argument.

**Usage**

preprocessTs(y)

**Arguments**

y

The input time series.

**Value**

The detrended and z-normalized time series.

Examples

```r
season_length <- 26
y <- sin(1:400*2*pi/season_length)
preprocessTs(y)
```
Compute the $S$ component of the SAZED ensemble

**Description**

$S$ computes the spectral density of its argument, and then derives the season length from it.

**Usage**

$$S(y, \text{preprocess} = T)$$

**Arguments**

- $y$: The input time series.
- preprocess: If true, $y$ is detrended and z-normalized before computation.

**Value**

The $S$ season length estimate of $y$.

**Examples**

```r
season_length <- 26
y <- sin(1:400*2*pi/season_length)
S(y)
S(y, preprocess = FALSE)
```

Compute the $S$ component of the SAZED ensemble

**Description**

$S$ computes the spectral density of its argument, and then derives the season length from it.

**Usage**

$$S(y, \text{preprocess} = T)$$

**Arguments**

- $y$: The input time series.
- preprocess: If true, $y$ is detrended and z-normalized before computation.

**Value**

The $S$ season length estimate of $y$.

**Examples**

```r
season_length <- 26
y <- sin(1:400*2*pi/season_length)
S(y)
S(y, preprocess = FALSE)
```
Examples

```r
season_length <- 26
y <- sin(1:400*2*pi/season_length)
Sa(y)
Sa(y, preprocess = FALSE)
```

---

**sazed**  
SAZED Ensemble (Optimum)

Description

`sazed` estimates a time series’ season length by combining 3 different estimates computed on an input time series and its 10-fold self-composed autocorrelation.

Usage

`sazed(y)`

Arguments

- `y`: The input time series.

Value

The season length of the input time series.

Examples

```r
season_length <- 26
y <- sin(1:400*2*pi/season_length)
sazed(y)
```

---

**sazed.maj**  
SAZED Ensemble (Majority)

Description

`sazed.maj` estimates a time series’ season length by computing 6 different estimates and taking a majority vote.

Usage

`sazed.maj(y, iter = 0, method = "down", preprocess = T)"`
**Arguments**

- **y** The input time series.
- **iter** The recursion depth.
- **method** The method used for breaking ties. One of c("alt","diff","down").
- **preprocess** If true, y is detrended and z-normalized before computation.

**Value**

The season length of the input time series.

**Examples**

```r
season_length <- 26
y <- sin(1:400*2*pi/season_length)
sazed.maj(y)
```

**Description**

The sazedR package provides the main function to compute season length, sazed, which is an ensemble of many season length estimation methods, also included in this package.

---

**ze**

**Description**

ze estimates the season length of its argument from the mean zero distance

**Usage**

```r
ze(y, preprocess = T)
```

**Arguments**

- **y** The input time series.
- **preprocess** If true, y is detrended and z-normalized before computation.

**Value**

The ZE season length estimate of y.
Examples
  
  season_length <- 26
  y <- sin(1:400*2*pi/season_length)
  ze(y)
  ze(y, preprocess = FALSE)

---

zed
Compute the ZED component of the SAZED ensemble

Description
  
  zed computes the zero density of its argument, and then derives the season length from it.

Usage
  
  zed(y, preprocess = T)

Arguments
  
  y       The input time series.
  preprocess   If true, y is detrended and z-normalized before computation.

Value
  
  The ZED season length estimate of y.

Examples
  
  season_length <- 26
  y <- sin(1:400*2*pi/season_length)
  zed(y)
  zed(y, preprocess = FALSE)
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