# Package 'sazedR'

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**Type** Package

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

**Version** 2.0.0

**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: <http://www.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

**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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`aze` *Compute the AZE component of the SAZED ensemble*

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## 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

```
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

```
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

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

## S — *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, 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

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

## Sa — *Compute the SA component of the SAZED ensemble*

### Description

Sa computes the autocorrelation of its argument, and then derives the season length from its spectral density.

### Usage

```
Sa(y, preprocess = T)
```

### Arguments

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

## Value

The SA season length estimate of y.

## Examples

```
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

```
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

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

`sazedR` *sazedR: A package for for estimating the season length of a seasonal time series.*

## 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 — *Compute the ZE component of the SAZED ensemble*

### Description

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

### Usage

```
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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