“HEDA” Package

Type Package

Title **H**ydropeaking **E**vents **D**etection **A**lgorithm

Version 1.0

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Description

License

Encoding UTF-8

LazyData true

RoxygenNote

NeedsCompliation no

Repository CRAN

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User Guide

1. Prior to using this library, users are required to import these packages: **dplyr**, **lubridate**, **zoo**, **ggplot2**.
2. The input files should be .csv files, and are required to only contain 3 columns, which are site id, date time and parameter value respectively.

Functions

```
HEDA_Tidy        Preprocess the data
```

Description

Format flow record into hourly record; Split record into dry and wet season data; interpolate and smoothing the record.

Usage

```
HEDA_Tidy(dataframe, dirPathForSM, dirPathForWT)
```

Arguments

dataframe	Name of the dataframe to be processed.
dirPathForSM	The directory path where dry season data will be saved.
dirPathForWT	The directory path where wet season data will be saved.

Outputs

Output files are generated in the designated directories, with 4 columns containing location id, datatime, parameter value, ann_thre.

Example

```
df = read.csv(filePath)
HEDA_Tidy(df, dirPathForSM, dirPathForWt)
```

```
ReversalCount        Detect hydropeaking events
```

Description

Detect change points of hydropeaking events and classified change points into four categories.

Usage

```
ReversalCount(dataframe, alpha1, theta)
```

Arguments

dataframe	Name of the dataframe to be processed.
alpha1	Default value : 0.03
theta	Default value : 60

Outputs

The output csv file will be saved into the directory path specified by dirPathForCt.

Example

```
alpha1 <- 0.03
theta <- 60
df <- read.table(filePath, sep = ",")
ReversalCount(df, alpha1, theta)
```

```
clean_position        Exclude change points in wrong position
```

Description

Change points are excluded if they are in the wrong position. For example, both point 3 and the peak pair represent the peaking discharge whose value (position) should be close to the daily maximum discharge. If the peaking discharge is close to the daily minimum discharge, change points will be removed since they are in the wrong positions.

Usage

clean_position(dataframe, alpha2)

Arguments

dataframe	Name of the dataframe to be processed.
alpha2	Default value : 0.3.

Outputs

The output is dataframe.

Example

```
alpha2 <- 0.3
df <- clean_position(df, alpha2)
```

```
clean_Spt        Clean repeated points
```

Description

Clean continuous points of the same type

Usage

clean_Spt(dataframe, alpha3, alpha4)

Arguments

dataframe	Name of the dataframe to be processed.
alpha3	The default value: 0.7
alpha4	The default value: 0.5

Outputs

The output file is dataframe.

Example

```
alpha3 <- 0.7
alpha4 <- 0.5
df <- clean_Spt(df, alpha3, alpha4)
```

```
clean_conectD        Evaluate difference between peaking and off-peaking discharge
```

Description

Evaluate whether the difference in discharge between peaking and off-peaking points is qualified to be identified as hydropeaking events.

Usage

clean_conectD(dataframe, alpha3, alpha4)

Arguments

dataframe	Name of the input dataframe to be processed.
alpha3	The default value: 0.7.
alpha4	The default value: 0.5.

Outputs

The output will be a dataframe in the same form with the input.

Example

```
alpha3 <- 0.7
alpha4 <- 0.5
df <- clean_conectD(df, alpha3, alpha4)
```

```
HPK_plot        Plot hydrograph
```

Description

Plot the hydrograph of the processed data with change points marked by different colors.

Usage

HPK_plot(dataframe)

Arguments

dataframe	Name of the input dataframe to be processed.

Outputs

The plot will be presented under the “Plots” tab in RStudio. Users can determine whether to save out the diagram by themselves.

Example

```
HPK_plot(df)
```

```
HPK_metrics        Extract metrics
```

Description

Extract 15 metrics from the identified hydropeaking events.

Usage

HPK_metrics(dataframe, dirPathForMetrics)

Arguments

dataframe	Name of the dataframe to be processed.
dirPathForMetrics	Folder path where the result will be stored.

Outputs

It is stored as a csv file in the working path specified by the user. Because the length of each metric is different, the median value of each metric is set to be the output. However, time-series value of metrics is produced.

Example

```
dirPathForMetrics <- ".../.../.../"
HPK_metrics(df, dirPathForMetrics)
```