Package 'regimeDetectionMeasures'

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Type Package

Title Calculate Measures for Detecting Ecological Regimes

Version 0.1.0

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Encoding UTF-8

LazyData true

Depends R (>= 3.1.2), dplyr, tidyr, ggplot2, PerformanceAnalytics, kedd

RoxygenNote 6.1.1

Description Calculate a suite of regime detection metrics for multivariate time series.

Suggests knitr,
rmarkdown

VignetteBuilder knitr

R topics documented:

`calculate_distanceTravelled`

Calculate the 'distance travelled' by the entire system.

Description

Calculate the 'distance travelled' by the entire system.

Usage

```
calculate_distanceTravelled(dataInDist, derivs = T, print = T)
```

Arguments

dataInDist	A data frame containing the following columns: - **Variable** is usually species identity - **Value** is the observed value (e.g. count, density) of the variable - **sortVar** is the variable along which distance is calculated (e.g., time). The example data set is munged such that the sortVar column is named time.
derivs	logical (default TRUE), calculates the velocity and acceleration of the distance travelled
print	logical (default TRUE), prints output to device

Details

Also calculates the velocity and acceleration of the entire system over the time series.

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calculate_EWS   *Calculate the early warning signals*

Description

Outputs data frame 'ews'. Metric values will be replicated

Usage

```
calculate_EWS(winData, winMove)
```

Arguments

winData	Used in calc_FisherInformation. Default = 2 data points
winMove	Proportion of data to be included in each moving window (0,1).
distances	A data frame of the distances and dervatives of distance travelled at each time point.

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calculate_FisherInformation
                        Fisher Information: three equations for calculating.

Description

Fisher Information: three equations for calculating.

Usage

```
calculate_FisherInformation(dataInFI, min.window.dat = 2,
  fi.equation = "7.12")
```

Arguments

dataInFI   A subset of data for each moving window. These data will be used to calculate the Fisher Information

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calculate_VI   *Calculate the Variance Index*

Description

Calculate the Variance Index

Usage

```
calculate_VI(winData, fill = 0)
```

Arguments

fill   Fill for missing data. Default = 0.

References

[1] Brock, William A., and Stephen R. Carpenter. "Variance as a leading indicator of regime shift in ecosystem services." Ecology and Society 11.2 (2006).

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munge_orig_dat   *Munge the Original Data Frame.*

Description

Munge the Original Data Frame.

Usage

```
munge_orig_dat(data = NULL, example = T, fill = NA)
```

Arguments

data   A data frame with ENTER DESCRIPTION

example   Loads and munges data when parameters data = NULL & Default = T, running the function will load and munge data from [1].

fill   Fills empty cells with this value. Default = NA. Consider using zero (0) as a fill if using species counts. Beware when using NA vs. zero. Default = 0

Value

Function returns a data frame in long format with columns specifying site name, time (or spatial unit), variable (e.g. species identity), and value (e.g. species count).

References

[1] Spanbauer, Trisha L., et al. "Prolonged instability prior to a regime shift." PLoS One 9.10 (2014): e108936.

Examples

```
munge_orig_dat() # will not write an object to environment
newDf = munge_orig_dat() # save the object to environment
```

---

plot_orig_data	*Plot original data*

Description

Plot original data

Usage

```
plot_orig_data(data, example = F, print = T, save = F,
  xLabel = "time")
```

Arguments

print	print plots to device when print = T. Default print = T.
save	NEEDS TO BE UPDATED TO CREATE LOCAL PLOT FOLDER AND EXPORT TO THIS FOLDER. JLB.
xLabel	Option to change the xLabel on resultant ggplot from "time" to ...

Value

Function returns a data frame in long format with columns specifying site name, time (or spatial unit), variable (e.g. species identity), and value (e.g. species count).

References

[1] Spanbauer, Trisha L., et al. "Prolonged instability prior to a regime shift." PLoS One 9.10 (2014): e108936.

Examples

```
df <- munge_orig_dat()
plot_orig_data(df)
```

---

plot_richness *Plot species richness over time for the original data*

Description

Plot species richness over time for the original data

Usage

```
plot_richness(data, example = F, print = T, save = F,
  xLabel = "time")
```

Arguments

print   print plots to device when print = T. Default print = T.

save   NEEDS TO BE UPDATED TO CREATE LOCAL PLOT FOLDER AND EX-
                 PORT TO THIS FOLDER. JLB.

Value

Function returns a data frame in long format with columns specifying site name, time (or spatial unit), variable (e.g. species identity), and value (e.g. species count).

References

[1] Spanbauer, Trisha L., et al. "Prolonged instability prior to a regime shift." PLoS One 9.10 (2014): e108936.

Examples

```
df <- munge_orig_dat()
plot_richness(df)
```

---

plot_timeDiff *Plot units of time elapsed between sampling points over the time series.*

Description

Plot units of time elapsed between sampling points over the time series.

Usage

```
plot_timeDiff(data, example = F, print = T, save = F,
  xLabel = "time")
```

Arguments

`print`	print plots to device when print = T. Default print = T.
`save`	NEEDS TO BE UPDATED TO CREATE LOCAL PLOT FOLDER AND EXPORT TO THIS FOLDER. JLB.

Value

Function returns a data frame in long format with columns specifying site name, time (or spatial unit), variable (e.g. species identity), and value (e.g. species count).

References

[1] Spanbauer, Trisha L., et al. "Prolonged instability prior to a regime shift." PLoS One 9.10 (2014): e108936.

Examples

```
df <- munge_orig_dat()
plot_timeDiff(df)
```

`rdm_window_analysis`	*Calculate the regime detection measured within a moving window.*

Usage

```
rdm_window_analysis(dataInRDM, winMove = 0.25, overrideSiteErr = F,
  min.window.dat = 2, fi.equation = "7.12", to.calc = c("VI", "FI",
  "EWS"), fill = 0)
```

Arguments

`dataInRDM`	A data frame with columns: - **sortVar**: usually time or some spatial dimension - **variable**: usually species - **value**: observations about the variable (e.g., count)
`winMove`	Number as proportion of each time series to be included in the moving windows. Default = 0.25 (25
	\itemmin.window.datUsed in calc_FisherInformation. Default = 2 data points
	\itemto.calcWhich measures to calculate. VI variance index. FI Fisher Information. EWS 1st through 4th moments, etc. Default = ALL measures.
	\itemfillUsed in the function 'calculate_VI()'. Fill value for missing data. Default = 0
	\itemmin.windowdatMinimum # of data points in each window to include in calculations. Default = 2.
	Calculate the regime detection measured within a moving window.

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