Package 'cosinor'

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Type Package

Title Tools for Estimating and Predicting the Cosinor Model

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Description A set of simple functions that transforms longitudinal data to estimate the cosinor linear model as described in Tong (1976). Methods are given to summarize the mean, amplitude and acrophase, to predict the mean annual outcome value, and to test the coefficients.

URL https://github.com/sachsmc/cosinor

Depends R (>= 2.11.0)

Imports ggplot2, shiny

Suggests knitr

License MIT + file LICENSE

LazyData true

VignetteBuilder knitr

RoxygenNote 7.2.1

NeedsCompilation no

Repository CRAN

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R topics documented:

`cosinor.lm` *Fit cosinor model*

Description

Given an outcome and time variable, fit the cosinor model with optional covariate effects.

Usage

```
cosinor.lm(formula, period = 12, data, na.action = na.omit)
```

Arguments

`formula`	Formula specifying the model. Indicate the time variable with `time()` and covariate effects on the amplitude and acrophase with `amp.acro()`. See details for more information.
`period`	Length of time for a complete period of the sine curve.
`data`	Data frame where variable can be found
`na.action`	What to do with missing data

Details

This defines special functions that are used in the formula to indicate the time variable and which covariates effect the amplitude. To indicate the time variable wrap the name of it in the function `time()`. To indicate a variable which affects the acrophase/amplitude, wrap the name in `amp.acro()`. This will then do all the transformations for you. See examples for usage.

References

Tong, YL. Parameter Estimation in Studying Circadian Rhythms, Biometrics (1976). 32(1):85–94.

Examples

```
cosinor.lm(Y ~ time(time) + X + amp.acro(X), data = vitamind)
```

cosinor.lm.default *Fit cosinor model*

Description

Given an outcome and time variable, fit the cosinor model with optional covariate effects.

Usage

```
cosinor.lm.default(formula, ...)
```

Arguments

formula	Forumla specifying the model. Indicate the time variable with `time()` and covariate effects on the amplitude and acrophase with `amp.acro()`. See details.
...	other arguments

Details

This defines special functions that are used in the formula to indicate the time variable and which covariates effect the amplitude. To indicate the time variable wrap the name of it in the function `time()`. To indicate a variable which affects the acrophase/amplitude, wrap the name in `amp.acro()`. This will then do all the transformations for you. See examples for usage.

Examples

```
cosinor.lm(Y ~ time(time) + X + amp.acro(X), data = vitamind)
```

cosinor_analyzer *Shiny application to demonstrate cosinor fit*

Description

Given a dataset, specify the outcome, time variable, and optional covariates. The app will then perform a cosinor analysis and plot the results.

Usage

```
cosinor_analyzer(data = NULL)
```

Arguments

data	Data frame to analyze

Examples

```
## Not run:
library(shiny)
cosinor_analyzer(vitamind)

## End(Not run)
```

`get_varnames` *Extract variable names from terms object, handling specials*

Description

Extract variable names from terms object, handling specials

Usage

```
get_varnames(Terms)
```

Arguments

`Terms`	a terms object

`ggplot_cosinor.lm` *Plot a cosinor model*

Description

Given a cosinor.lm model fit, generate a plot of the data with the fitted values. Optionally allows for plotting by covariate levels 0 and 1.

Usage

```
ggplot_cosinor.lm(object, x_str = NULL)
```

Arguments

`object`	An object of class `cosinor.lm`
`x_str`	Character vector naming the covariate(s) to be plotted. May be NULL to plot overall curve

Examples

```
fit <- cosinor.lm(Y ~ time(time) + X + amp.acro(X), data = vitamind)
ggplot_cosinor.lm(fit, "X")
```

predict.cosinor.lm *Predict from a cosinor model*

Description

Given a time variable and optional covariates, generate predicted values from a cosinor fit. Default prediction is the mean value, optionally can predict at a given month

Usage

```
## S3 method for class 'cosinor.lm'
predict(object, newdata, ...)
```

Arguments

object	An object of class cosinor.lm
newdata	Optional new data
...	other arguments

Examples

```
fit <- cosinor.lm(Y ~ time(time) + X + amp.acro(X), data = vitamind)
predict(fit)
```

print.cosinor.lm *Print cosinor model*

Description

Given an outcome and time variable, fit the cosinor model with optional covariate effects.

Usage

```
## S3 method for class 'cosinor.lm'
print(x, ...)
```

Arguments

x	cosinor.lm object
...	passed to summary

print.summary.cosinor.lm *Print the summary of a cosinor model*

Description

Print the summary of a cosinor model

Usage

```
## S3 method for class 'summary.cosinor.lm'
print(x, ...)
```

Arguments

x	An object of class summary.cosinor.lm
...	Currently unused

Examples

```
fit <- cosinor.lm(Y ~ time(time) + X + amp.acro(X), data = vitamind)
summary(fit)
```

print.test *Print test of model*

Description

Print test of model

Usage

```
## S3 method for class 'test'
print(x)
```

Arguments

x	test object

print.test_cosinor *Print results of test of cosinor model*

Description

Print results of test of cosinor model

Usage

```
## S3 method for class 'test_cosinor'
print(x, ...)
```

Arguments

x	test_cosinor object
...	Arguments passed to print

simulate_cosinor *Simulate data from a cosinor model*

Description

This function simulates data from a cosinor model with a single covariate, where the time scale is month, and optionally allows for single covariate effects on the mean, amplitude, and acrophase.

Usage

```
simulate_cosinor(n, beta.mean = 2, beta.amp = 0, beta.acro = 0)
```

Arguments

n	Sample size
beta.mean	Effect on the mean (intercept)
beta.amp	Effect on the amplitude
beta.acro	Effect on the acrophase

summary.cosinor.lm *Summarize a cosinor model*

Description

Given a time variable and optional covariates, generate inference a cosinor fit. Gives estimates, confidence intervals, and tests for the raw parameters, and for the mean, amplitude, and acrophase parameters. If the model includes covariates, the function returns the estimates of the mean, amplitude, and acrophase for the group with covariates equal to 1 and equal to 0. This may not be the desired result for continuous covariates.

Usage

```
## S3 method for class 'cosinor.lm'
summary(object, ...)
```

Arguments

object	An object of class cosinor.lm
...	Currently unused

Examples

```
fit <- cosinor.lm(Y ~ time(time) + X + amp.acro(X), data = vitamind)
summary(fit)
```

test_cosinor *Test for differences in a cosinor model*

Description

Given a time variable and optional covariates, generate inference a cosinor fit. For the covariate named (or vector of covariates), this function performs a Wald test comparing the group with covariates equal to 1 to the group with covariates equal to 0. This may not be the desired result for continuous covariates.

Usage

```
test_cosinor(object, x_str, param = "amp")
```

Arguments

object	An object of class cosinor.lm
x_str	Character naming the covariate whose amplitude/acrophase will be tested
param	Character string naming the parameter to test, either "amp" for amplitude or "acr" for acrophase

Examples

```
fit <- cosinor.lm(Y ~ time(time) + X + amp.acro(X), data = vitamind)
test_cosinor(fit, "X", "amp")
```

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update_covnames *Replace covariate names with descriptive text*

Description

Replace covariate names with descriptive text

Usage

```
update_covnames(names)
```

Arguments

names	Coefficient names to update

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vitamind *Vitamin D*

Description

Simulated data set to illustrate the cosinor model. Y is an outcome variable that varies of time time according to a cosine curve. The binary covariate X is associated with the mean and amplitude of the cosine curve.

Usage

```
vitamind
```

Format

A data frame with 3 variables: X, Y, time.

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