Package ‘cosinor’

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Type  Package
Title  Tools for estimating and predicting the cosinor model
Version  1.1
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Description  cosinor is 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  http://github.com/sachsmc/cosinor
Depends  R (>= 2.11.0)
Imports  ggplot2, shiny
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R topics documented:

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**cosinor.lm**

**Description**

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

**Usage**

```r
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**


**Examples**

```r
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**

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

**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.
- `...`: Other arguments

**Details**

This defines special functions that are used in the formula to indicate the time variable and which covariates affect 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**

```r
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**

```r
cosinor_analyzer(data = vitamind)
```

**Arguments**

- `data`: Data frame to analyze
Examples

```r
## 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**

```r
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**

```r
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**

```r
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

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

Arguments

- **object**: An object of class `cosinor.lm`
- **newdata**: Optional new data
- **...**: other arguments

Examples

```r
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

```r
## 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**

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

**Arguments**

- `object`: An object of class `cosinor.lm`
- `...`: Currently unused

**Examples**

```r
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**

```r
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

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

Description

Replace covariate names with descriptive text

Usage

`update_covnames(names)`

Arguments

- `names`: Coefficient names to update

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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