Package ‘homeR’

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Type Package

Title Useful Functions for Building Physics

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Description A collection of functions useful for the analysis of building physics experiments.

License GPL (>= 2)

LazyLoad yes

Encoding UTF-8

Suggests testthat, plyr

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NeedsCompilation no

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Bayesian Heating Model

Description

Estimates the parameters of a building's heating model.

Usage

bhm(formula, data, baseLoad = NULL)

Arguments

formula  
an object of class "formula": a description of which variable holds the energy readouts and which variable holds the daily temperatures.

data  
a data frame in which the energy and daily temperatures are to be found.

baseLoad  
a optional constant base load, e.g. for domestic hot water preparation.

Details

bhm assumes that the heating energy for a building has been measured over several time periods (not necessarily of equal length). The data data frame should have one row per measurement period. The energy vector (whose name is given on the left-hand side of the formula) will have the total energy measured during each period. The daily temperature vector (whose name is given on the right-hand side of the formula) will have either a vector of average daily temperatures (when each measurement period is just one day) or a list of vectors (when each measurement period can be an arbitrary number of days).

Value

bhm returns an object of class "bhm". The generic accessor functions coefficients, vcov and residuals extract the usual information from the fitted model, while logposterior will return a function that evaluates the log-posterior as a function of the parameters.

Examples

set.seed(1111)

# Simple, but unrealistic parameters
K <- 1
tb <- 1
DHW <- 1
sigma <- 1e-2
temps <- tb + c(-2, -1, 0, 1)

# With daily measurements
E <- K * pmax(tb - temps, 0) + DHW + rnorm(length(temps), 0, sigma)
fourDayData <- data.frame(E = E, T = temps)
## Not run:

```r
fit <- bhmHe ~ tL fourdaydataI
coef(fit)
resid(fit)
```

## End(Not run)

# With two-day measurements

```r
fourTimesTwoDayData <- with(fourdaydata,
      data.frame(E = 2 * E,
                  T = lapply(T, function(x) c(x, x))))
fit2 <- bhm(E ~ T, fourTimesTwoDayData)
coef(fit2)
resid(fit2)
```

---

### logposterior

**Log-posterior of a Bayesian Heating Model**

**Description**

Provides the log-posterior of a heating model given the data, as a function of the model’s parameters.

**Usage**

```r
logposterior(bhm)
```

**Arguments**

- `bhm` a fitted model returned by a call to `bhm()`

**Value**

A function of the model’s parameters (currently K, tb, DHW and sigma)

---

### pmv

**Predicted Mean Vote**

**Description**

Computes Fanger’s predicted mean vote.

**Usage**

```r
pmv(clo, met, air.temp, saturation)
```
Arguments

- **clo**: Thermal insulation of clothing in [clo] (underwear, blouse/shirt, slacks/trousers, jacket, socks and shoes are approximately 1 clo)
- **met**: Physical activity in [met] (one person seated at rest is approximately 1 met)
- **air.temp**: Indoor air temperature (assumed equal to mean radiant temperature) in [C]
- **saturation**: Ratio of moisture content to moisture content of saturated air at the same temperature, in [%] (approximately the same thing as relative humidity)

Details

Compute the predicted mean vote for one or more combinations of clo, met, air temperature and moisture saturation. The inputs arguments can be scalars or vectors.

Value

The predicted mean vote, a value between -3 (cold) to +3 (hot)

References

CIBSE Guide A, section 1.4 and 1.A1.2 (from which this implementation is derived)

Examples

```r
# With scalars
pmv(clo=1.0,
   met=1.2,
   air.temp=19,
   saturation=40)

# With vectors
pmv(clo=c(1.0, 1.5),
    met=c(1.2, 0.6),
    air.temp=c(19, 30),
    sat=c(35, 40))
```
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