Multivariate Adaptive Regression Splines (MARS)

Description

Fit Friedman's Multivariate Adaptive Regression Splines (MARS) model.

Usage

```
mars(formula, data, control) #for generating a mars object
```

Arguments

`formula`
: an R formula specifying the dependent and independent variables in the model. The formula should take the form y ~ x1 + x2 + ..., where y is the response variable and x1, x2, etc. are the predictor variables.

`data`
: a data frame containing the variables in the formula.

`control`
: an object of class mars.control that specifies parameters used in the model fitting procedure. By default, the control object is constructed using `mars.control()`, with default values for the parameters.

Details

The function first extracts the response variable and the predictor variables from the data frame using the formula and `model.frame() function` . Then, it performs forward stepwise regression on the data using the `fwd_stepwise()` function, followed by backward stepwise regression on the selected terms using the `bwd_stepwise()` function. The resulting basis functions and basis matrix are stored in the bwd object. Finally, a linear model is fit to the data using the `lm()` function, with the basis matrix and response variable as inputs. The resulting object is returned as a list with class 'mars'.

Value

an object of class 'mars' which will be used for plot, predict, etc.

Author(s)

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References

Friedman, J. H. (1991). Multivariate adaptive regression splines. The Annals of Statistics, 19(1), 1-67.

See Also

`print.mars()`

`summary.mars()`

`predict.mars()`

`plot.mars()`

`anova.mars()`

Examples

```
#example 1
# mars() with ISLR::Wage dataset
fit.mars <- mars(wage ~ age + education, data=ISLR::Wage, control = mars.control(Mmax=10))
# Show results
fit.mars

#example 2
# create your own dataset
n <- 1000
x1 <- rnorm(n)
x2 <- rnorm(n)
x3 <- rnorm(n)
y <- 2*x1 + 3*x2 + 4*x3 + rnorm(n)
df <- data.frame(x1=x1,x2=x2,x3=x3,y=y)
```

```
# fit a MARS model
fit <- mars(y ~ x1 + x2 + x3, data=df)
#show results
fit

#example 3
# another example using data(iris)
fit.iris <- mars(Sepal.Length ~., data=iris, control = mars.control(Mmax=10))
# Show results
fit.iris
```