Package ‘sprsmdl’

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sprsmdl-package Sparse modeling toolkit

Description
R functions to mine sparse models from data.

Details
Providing functions to find few but significant variables that can explain data well.

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**Description**

Sparse logistic regression (SLR) with automatic relevance determination (ARD).

**Usage**

```
SLrArd(T, X, bias = TRUE, method = c("VB", "VBMacKay", "PX-VB"), control = list(), check.lb=TRUE, aP =
```

**Arguments**

- `T` A vector of binary categorical dependent variable.
- `X` A matrix, each row of which is a vector of independent variables.
- `bias` A logical value specifying whether to include intercept or not.
- `method` The method to be used. See ‘Details’.
- `control` A list of control parameters. See ‘Details’.
- `check.lb` A logical value whether to check the validity of parameter updates. Defaults to TRUE.

**Hyper parameters:**

- `aP` Shape of Gamma distribution.
- `bP` Rate of Gamma distribution.

**Initial values:**

- `muP` Coefficients.
- `xiP` Variational parameter.

**Details**

Some independent variables can be pruned in each VB-EM iteration and never be used for successive iterations when irrelevance of the variables exceed a threshold determined by `control$pruning`. Explicitly set `control$pruning = Inf` to prevent the pruning.

Method “VB” is a variational Bayesian method that is robust. See Bishop (2006).

Method “VBMacKay” is basically same as “VB” but some parameters are updated based on method of MacKay (1992). Global convergence has not been proven but this algorithm will be faster.

Method “PX-VB” based on the Parameter eXpanded VB method proposed in Qi and Jaakkola (2007). Global convergence is proven and could be faster than “VB”.

The `control` argument is a list that can supply any of the following components:
• pruning: threshold of independent variables pruning. No variables are pruned if ‘Inf’. Defaults to ‘1e+8’.

See ?optim for meanings of the following control parameters.

• maxit: Defaults to ‘10^5’.
• reltol: Defaults to ‘sqrt(.Machine$double.eps)’.
• trace: Defaults to ‘TRUE’.
• REPORT: Defaults to ‘floor(control$maxit / 20)’.

Value

coefficients A named vector of coefficients.
irrelevance A named vector of irrelevance.
iterations A number of iterations.
converged A logical value giving whether the iterations converged or not.
lowerbound The lower bound of the marginal log-likelihood minus a constant term.
method The method used.
lb.diff The difference of the lower bounds in each update. This exists when check.lb = TRUE.
fitted.values The fitted values.
residuals The residuals, that is T minus fitted values.

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References


Examples

data(iris)

tmp <- iris[iris$Species != 'versicolor',]
T <- tmp$Species == 'setosa'
X <- as.matrix(tmp[,1:4])

res <- SlrArd(T, X, bias=TRUE, method="VB", control = list(maxit=500))
print(coefficients(res))

res <- SlrArd(T, X, bias=TRUE, method="VBMacKay")  ## faster
print(coefficients(res))

res <- SlrArd(T, X, bias=FALSE, method="VBMacKay")  ## without bias
print(coefficients(res))
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