Package 'ramsvm'

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Type Package

Title Reinforced Angle-Based Multicategory Support Vector Machines

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Description Provides a solution path for Reinforced Angle-based Multicategory
Support Vector Machines, with linear learning, polynomial learning, and
Gaussian kernel learning. C. Zhang, Y. Liu, J. Wang and H. Zhu. (2016)
<doi:10.1080/10618600.2015.1043010>.

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Contents

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predict   *A function that provides class label predictions for objects returned by the "ramsvm" function.*

Description

This function provides predictions on a test data set using the obtained classifier from a call of the ramsvm function.

Usage

```
## S4 method for signature 'ramsvm'
predict(object,newdata=NULL,lambda=NULL,...)
```

Arguments

object   An object returned by the "ramsvm" function.

newdata   The new predictor matrix. The number and order of predictors in newdata should be the same as those of x, which is used in the ramsvm function. If not specified, the program uses the training x matrix as the prediction object.

lambda   The lambda values on which the user wants to predict. If not specified, the program will use the lambda values returned by the ramsvm function.

...   Not used.

Value

pred.y   A prediction is made for each lambda value.

Author(s)

Chong Zhang, Yufeng Liu, and Shannon Holloway

References

C. Zhang, Y. Liu, J. Wang and H. Zhu. (2016). Reinforced Angle-based Multicategory Support Vector Machines. Journal of Computational and Graphical Statistics, 25, 806-825.

See Also

ramsvm

Examples

```
data(iris)
a <- ramsvm(x = as.matrix(iris[,-5]),
            y = iris[,5],
            lambda = 0.2,
            kernel="gaussian")
predict(a)
```

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ramsvm   *The classifier for Reinforced Angle-Based Multicategory Support Vector Machines (RAMSVMs).*

Description

A function that provides the RAMSVMs classifier for linear learning, polynomial learning, and kernel learning.

Usage

```
ramsvm(x, y, lambda, gamma = 0.5, weight = NULL, kernel = "linear",
       kparam = NULL, large = FALSE, epsilon = NULL, warm = NULL,
       nb.core=NULL)
```

Arguments

x	The x matrix for the training dataset. Columns represent the covariates, and rows represent the instances. There should be no NA/NaN values in x.
y	The labels for the training dataset.
gamma	The convex combination parameter of the loss function.
weight	The weight vector for each observation. By default, the program uses equal weights for all observations.
lambda	The user specified lambda values.
kernel	The kernel for classification.
kparam	The kernel parameter. If kernel=linear, this option is ignored. For kernel=polynomial, it is the order of the polynomial functions. For kernel=gaussian, it is the Gaussian kernel parameter.
large	Whether the number of observations is large in the data. If TRUE, then the algorithm will split the data set into several parts and train on each part to provide a warm start for the entire data training. This option aims to enhance the computational speed.
epsilon	Convergence threshold in coordinate descent circling algorithm. The smaller epsilon is, the more accurate the final model is, and the more time it takes for calculation. Default is (0.0001*number of observations*number of classes).

| warm | A matrix that contains the warm start for slack variables alpha. This option is especially useful when the user wishes to obtain the classifier with higher level accuracy (smaller epsilon) or with a different lambda, if the warm start is available from an existing ramsvm output. |
| nb.core | The number of threads to use for parallel computing. If null, the code will automatically detect and use the number of CPU cores. This option is used only when large=TRUE. |

Value

An object of class ramsvm is returned.

If kernel=linear, this S4 object contains the following:

x	A copy of the input covariate matrix.
y	A copy of the input labels.
y.name	The class names of y.
k	Number of classes in the classification problems.
gamma	A copy of the convex combination parameter of the loss function.
weight	The weight vector for each observation.
lambda	The lambda vector of all lambdas in the solution path.
beta	A list of matrices containing the estimated parameters of the classification function. Each matrix in the list corresponds to the lambda value in the solution path in order. For one single matrix, the rows correspond to a specific predictor.
beta0	A list of the intercepts of the classification function. Each vector in the list corresponds to the lambda in the solution path in order.
epsilon	Convergence threshold in coordinate descent circling algorithm.
call	The call of ramsvm.

If kernel != linear the S4 object also contains the following:

| kernel | The kernel for classification. |
| kparam | The kernel parameter. |

Author(s)

Chong Zhang, Yufeng Liu, and Shannon Holloway

References

C. Zhang, Y. Liu, J. Wang and H. Zhu. (2016). Reinforced Angle-based Multicategory Support Vector Machines. Journal of Computational and Graphical Statistics, 25, 806-825.

See Also

predict

Examples

```
data(iris)
ramsvm(x = as.matrix(iris[,-5]),
       y = iris[,5],
       lambda = 0.2,
       kernel="gaussian")
```

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