About the utility - reg\_tune: hyperparameter search for regression models over ranges in ranges. - Example: tuning reg\_svm varying epsilon, cost, and kernel.

Environment setup.

# Regression tuning   
  
# installation   
#install.packages("daltoolbox")  
  
# loading DAL  
library(daltoolbox)

Load dataset and inspect.

# Dataset for regression analysis  
  
library(MASS)  
data(Boston)  
print(t(sapply(Boston, class)))

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## crim zn indus chas nox rm age dis rad tax ptratio black lstat medv  
## 1 0.00632 18 2.31 0 0.538 6.575 65.2 4.0900 1 296 15.3 396.90 4.98 24.0  
## 2 0.02731 0 7.07 0 0.469 6.421 78.9 4.9671 2 242 17.8 396.90 9.14 21.6  
## 3 0.02729 0 7.07 0 0.469 7.185 61.1 4.9671 2 242 17.8 392.83 4.03 34.7  
## 4 0.03237 0 2.18 0 0.458 6.998 45.8 6.0622 3 222 18.7 394.63 2.94 33.4  
## 5 0.06905 0 2.18 0 0.458 7.147 54.2 6.0622 3 222 18.7 396.90 5.33 36.2  
## 6 0.02985 0 2.18 0 0.458 6.430 58.7 6.0622 3 222 18.7 394.12 5.21 28.7

Optional conversion to matrix.

# for performance, you can convert to matrix  
Boston <- as.matrix(Boston)

Train/test split for tuning validation.

# preparing dataset for random sampling  
set.seed(1)  
sr <- sample\_random()  
sr <- train\_test(sr, Boston)  
boston\_train <- sr$train  
boston\_test <- sr$test

Hyperparameter grid configuration and search training.

# Training  
  
tune <- reg\_tune(reg\_svm("medv"),   
 ranges = list(seq(0,1,0.2), cost=seq(20,100,20), kernel = c("radial")))  
model <- fit(tune, boston\_train)

Training evaluation with the best hyperparameters.

# Model adjustment  
  
train\_prediction <- predict(model, boston\_train)  
boston\_train\_predictand <- boston\_train[,"medv"]  
train\_eval <- evaluate(model, boston\_train\_predictand, train\_prediction)  
print(train\_eval$metrics)

## mse smape R2  
## 1 2.393491 0.05155025 0.9734081

Test evaluation.

# Test  
  
test\_prediction <- predict(model, boston\_test)  
boston\_test\_predictand <- boston\_test[,"medv"]  
test\_eval <- evaluate(model, boston\_test\_predictand, test\_prediction)  
print(test\_eval$metrics)

## mse smape R2  
## 1 13.61128 0.1297673 0.7738067

Example grids for other models.

# Options for other models  
  
# svm  
ranges <- list(seq(0,1,0.2), cost=seq(20,100,20), kernel = c("linear", "radial", "polynomial", "sigmoid"))  
  
# knn  
ranges <- list(k=1:20)  
  
# mlp  
ranges <- list(size=1:10, decay=seq(0, 1, 0.1))  
  
# rf  
ranges <- list(mtry=1:10, ntree=1:10)

References - Kohavi, R. (1995). A Study of Cross-Validation and Bootstrap for Accuracy Estimation and Model Selection. IJCAI.