About the method - reg\_dtree: decision tree for regression. Partitions feature space and estimates values by leaf means; interpretable and can model nonlinearities.

Environment setup.

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

Load Boston dataset (MASS) and inspect types.

# 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 in some methods.

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

Random train/test split.

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

Train regression tree model to predict medv.

# Training  
  
model <- reg\_dtree("medv")  
model <- fit(model, boston\_train)

Training evaluation (regression metrics, e.g., RMSE, MAE).

# 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 12.68065 0.1345098 0.8591168

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 29.38142 0.1642396 0.5117372

References - Breiman, L., Friedman, J., Olshen, R., and Stone, C. (1984). Classification and Regression Trees. Wadsworth.