Comparaci?n DT en R y en Python

October 22, 2018

1 Comparación DT en R y en Python

En este notebook compararé el comportamiento del modelo DecisionTree de R con el de Python, para ver si descrepan.

Iré modificando los parámetros que cada uno tiene, y veremos el accuracy que consigue cada uno

```
In [1]: sos_path = "../../datasets/falldetection/falldetection.csv"
```

1.1 En python3

```
In [2]: %use python3

        import pandas as pd
        import numpy as np
        from sklearn.tree import DecisionTreeClassifier
        import matplotlib.pyplot as plt
        df = pd.read_csv(sos_path)

In [3]: N = df.shape[0]
        prop_train = 2 / 3
        N_train = np.ceil(N * prop_train).astype(np.int64)
        N_test = N - N_train

In [4]: data = df.drop(["ACTIVITY"], 1)
        target = df.ACTIVITY

In [5]: data_train = data.iloc[:N_train]
        data_test = data.iloc[N_train:]

        target_train = target[:N_train]
        target_test = target[N_train:]

In [6]: dtc = DecisionTreeClassifier()

In [7]: dtc.fit(data_train, target_train)
```

```
Out[7]: DecisionTreeClassifier(class_weight=None, criterion='gini', max_depth=None,
                    max_features=None, max_leaf_nodes=None,
                    min_impurity_decrease=0.0, min_impurity_split=None,
                    min_samples_leaf=1, min_samples_split=2,
                    min_weight_fraction_leaf=0.0, presort=False, random_state=None,
                    splitter='best')

In [8]: train_score = dtc.score(data_train, target_train)
        test_score = dtc.score(data_test, target_test)

In [9]: train_score, test_score

Out[9]: (1.0, 0.6915750915750916)
```

1.2 En R

```
In [10]: %use R
         library(rpart)
         df = read.csv(sos_path)

In [11]: df$ACTIVITY = as.factor(df$ACTIVITY)

In [12]: N = nrow(df)
         prop_train = 2/3
         N_train = ceiling(N * prop_train)
         N_test = N - N_train
         data_train = df[1:N_train,]
         data_test = df[(N_train + 1):N,]

In [13]: ctrl = rpart.control(
             minsplit = 2,
             cp = 0,
             maxcomplete = 0,
             maxsurrogate = 0,
             usesurrogate = 0,
             xval = 10,
             surrogatestyle = 0,
             maxdepth = 30,
         )

In [14]: rpt = rpart(ACTIVITY ~ ., data = data_train,control = ctrl, method = "class")

In [15]: train_pred = predict(rpt, data_train, type = "class")
         test_pred = predict(rpt, data_test, type = "class")

In [16]: train_cf = table(data_train$ACTIVITY, train_pred)
         test_cf = table(data_test$ACTIVITY, test_pred)

In [17]: R_train_score = sum(diag(train_cf)) / nrow(data_train)
         R_test_score = sum(diag(test_cf)) / nrow(data_test)
```

```
In [18]: R_train_score
```

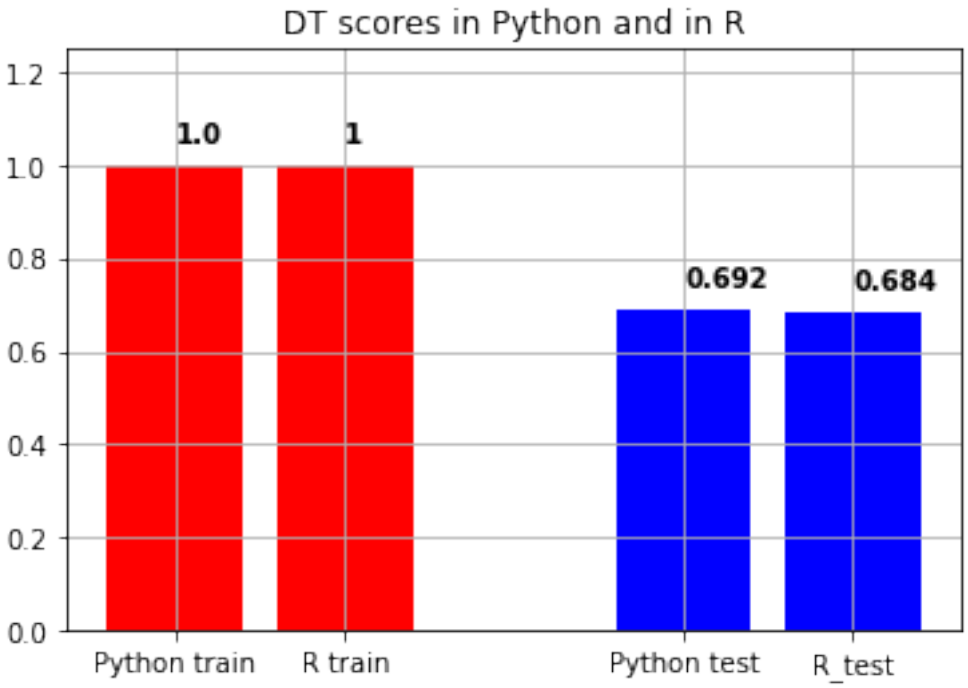
1

```
In [19]: R_test_score
```

0.684065934065934

```
In [20]: %get R_train_score R_test_score --from R

         scores = [train_score,R_train_score, test_score,R_test_score]
         labs = ["Python train", "R train", "Python test",  "R_test"]
         cols = ["r","r","b","b"]
         posit = [0,1,3,4]
         plt.bar(x = posit,  height = scores, tick_label = labs, color = cols)
         plt.grid(True)
         plt.title("DT scores in Python and in R")
         plt.ylim(0,1.25)
         for i in range(len(scores)):
             plt.text(posit[i], scores[i] + 0.05, round(scores[i],3),fontweight='bold')
```



1.3 Modificando min_samples_split

1.3.1 En R

```
In [21]: %use R
         df = read.csv(sos_path)
```

```
df$ACTIVITY = as.factor(df$ACTIVITY)
N = nrow(df)
prop_train = 2/3
N_train = ceiling(N * prop_train)
N_test = N - N_train
data_train = df[1:N_train,]
data_test = df[(N_train + 1):N,]
```

```
In [22]: spl = 2:60
```

```
In [23]: f = function(s)
             {
                 ctrl = rpart.control(
                     minsplit = s,
                     cp = 0,
                     maxcomplete = 0,
                     maxsurrogate = 0,
                     usesurrogate = 0,
                     xval = 10,
                     surrogatestyle = 0,
                     maxdepth = 30,
                 )
                 rpt = rpart(ACTIVITY ~ ., data = data_train,control = ctrl, method = "class")

                 train_pred = predict(rpt, data_train, type = "class")
                 test_pred = predict(rpt, data_test, type = "class")

                 train_cf = table(data_train$ACTIVITY, train_pred)
                 test_cf = table(data_test$ACTIVITY, test_pred)

                 R_train_score = sum(diag(train_cf)) / nrow(data_train)
                 R_test_score = sum(diag(test_cf)) / nrow(data_test)
                 return(list("train" = R_train_score, "test" = R_test_score))
             }
```

```
In [24]: res = sapply(spl, FUN = "f")
```

```
In [25]: R_train_scores = res[1, 1:ncol(res)]
         R_test_scores = res[2, 1:ncol(res)]
```

1.3.2 En Python3

```
In [26]: clf = DecisionTreeClassifier()
```

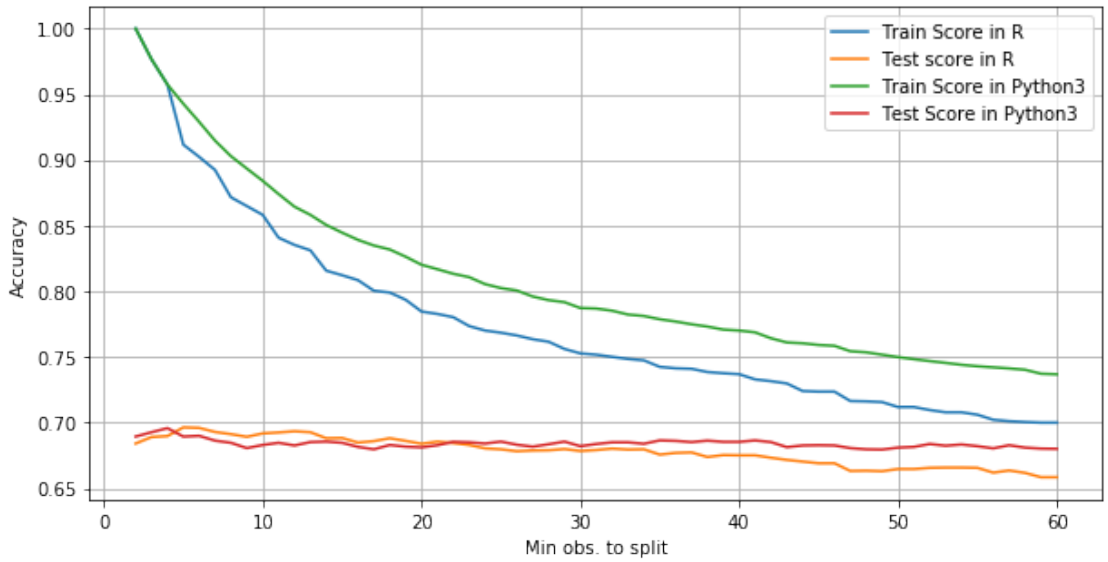
```
In [27]: python_train_scores = []
         python_test_scores = []
         for i in range(2,61):
             clf.set_params(min_samples_split = i)
             clf.fit(data_train, target_train)
```

```
        train_score = clf.score(data_train, target_train)
        test_score = clf.score(data_test, target_test)

        python_train_scores.append(train_score)
        python_test_scores.append(test_score)
```

```
In [28]: %get R_train_scores R_test_scores spl --from R
         plt.figure(figsize=(10,5))
         plt.plot(spl ,R_train_scores, label = "Train Score in R")
         plt.plot(spl, R_test_scores, label = "Test score in R")
         plt.plot(spl, python_train_scores, label = "Train Score in Python3")
         plt.plot(spl, python_test_scores, label = "Test Score in Python3")
         plt.grid(True)
         plt.legend()
         plt.xlabel("Min obs. to split")
         plt.ylabel("Accuracy")
         #plt.ylim(0.5,1.1)
```

```
Out[28]: Text(0, 0.5, 'Accuracy')
```



1.4 Modificando max_depth

```
In [29]: %use R

         df = read.csv(sos_path)

         df$ACTIVITY = as.factor(df$ACTIVITY)
```

```
N = nrow(df)
prop_train = 2/3
N_train = ceiling(N * prop_train)
N_test = N - N_train

data_train = df[1:N_train,]

data_test = df[(N_train + 1):N,]

d = 2:30
```

In [30]:
```
f = function(d) {
    ctrl = rpart.control(
            minsplit = 20,
            cp = 0,
            maxcomplete = 0,
            maxsurrogate = 0,
            usesurrogate = 0,
            xval = 10,
            surrogatestyle = 0,
            maxdepth = d,
    )
    rpt = rpart(ACTIVITY ~ ., data = data_train,control = ctrl, method = "class")

    train_pred = predict(rpt, data_train, type = "class")
    test_pred = predict(rpt, data_test, type = "class")

    train_cf = table(data_train$ACTIVITY, train_pred)
    test_cf = table(data_test$ACTIVITY, test_pred)

    R_train_score = sum(diag(train_cf)) / nrow(data_train)
    R_test_score = sum(diag(test_cf)) / nrow(data_test)
    return(list("train" = R_train_score, "test" = R_test_score))
}
```

In [31]:
```
res = sapply(d, FUN = "f")
```

In [32]:
```
R_train_scores = res[1, 1:ncol(res)]
R_test_scores = res[2, 1:ncol(res)]
```

Nos pasamos a python

In [33]:
```
clf = DecisionTreeClassifier()
```

In [34]:
```
python_train_scores = []
python_test_scores = []
d = list(range(2,31))
for i in d:
    clf.set_params(max_depth = i)
```

```
            clf.fit(data_train, target_train)
            train_score = clf.score(data_train, target_train)
            test_score = clf.score(data_test, target_test)

            python_train_scores.append(train_score)
            python_test_scores.append(test_score)
```

In [35]:
```
%get R_train_scores R_test_scores --from R
plt.figure(figsize=(10,5))
plt.plot(d ,R_train_scores, label = "Train Score in R")
plt.plot(d, R_test_scores, label = "Test score in R")
plt.plot(d, python_train_scores, label = "Train Score in Python3")
plt.plot(d, python_test_scores, label = "Test Score in Python3")
plt.grid(True)
plt.legend()
plt.xlabel("Max depth")
plt.ylabel("Accuracy")
#plt.ylim(0.5,1.1)
```

Out[35]:
```
Text(0, 0.5, 'Accuracy')
```