9/28 수업대체 과제 Decision Tree

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제공된 PimaIndiansDiabetes dataset을 가지고 Classification 모델을 개발 하고자 한다.

(마지막의 diabetes 컬럼이 class label 임)

다음의 문제를 해결하기 위한 Python 코드를 작성하고 실행 결과를 캡쳐하여 보이시오

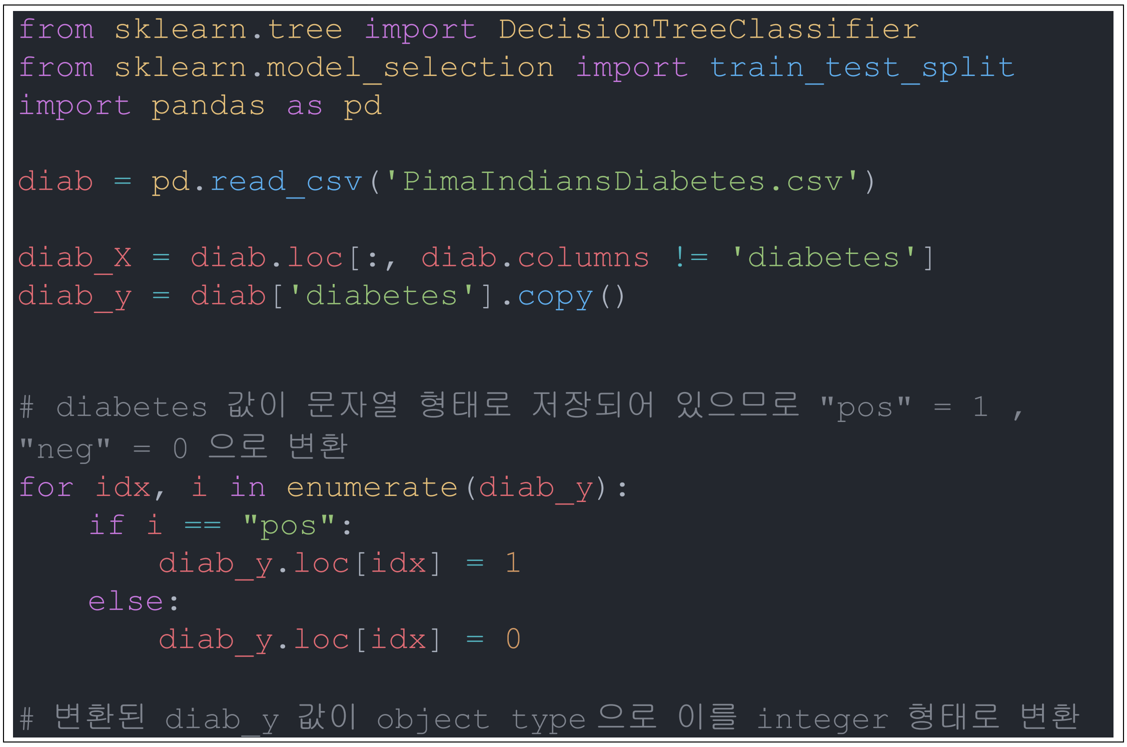
(실행 결과가 길 경우에는 마지막 10줄 정도만 캡쳐)

Q1 (2점) scikit-learn에서 제공하는 DecisionTree 알고리즘을 이용하여 모델을 생성하고

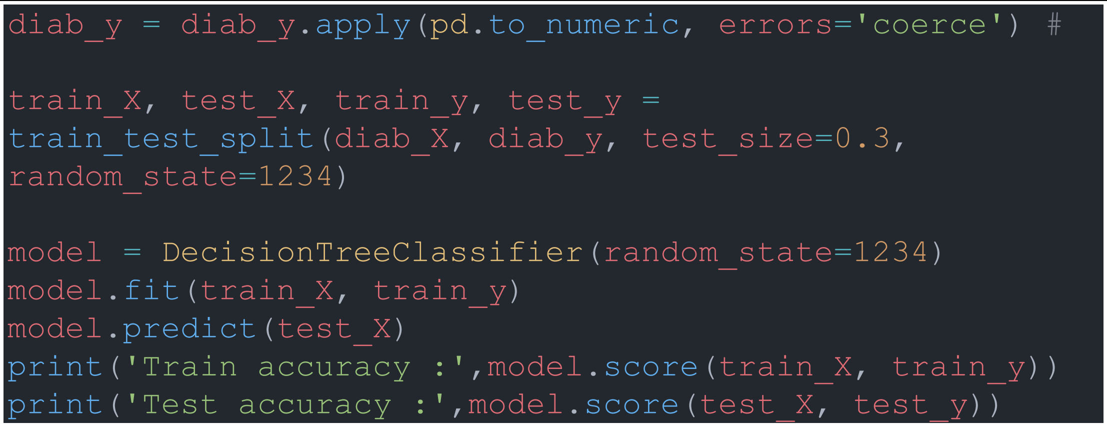
training accuracy 와 test accuracy를 보이시오

* 강의 ppt 21~23의 코드를 활용

Source code :

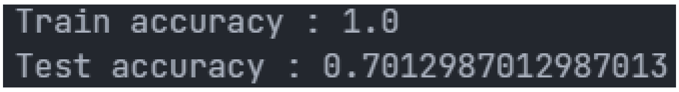


```
from sklearn.tree import DecisionTreeClassifier
from sklearn.model_selection import train_test_split
import pandas as pd

diab = pd.read_csv('PimaIndiansDiabetes.csv')

diab_X = diab.loc[:, diab.columns != 'diabetes']
diab_y = diab['diabetes'].copy()


# diabetes 값이 문자열 형태로 저장되어 있으므로 "pos" = 1 ,
"neg" = 0 으로 변환
for idx, i in enumerate(diab_y):
    if i == "pos":
        diab_y.loc[idx] = 1
    else:
        diab_y.loc[idx] = 0

# 변환된 diab_y 값이 object type 으로 이를 integer 형태로 변환
```



```
diab_y = diab_y.apply(pd.to_numeric, errors='coerce') #

train_X, test_X, train_y, test_y =
train_test_split(diab_X, diab_y, test_size=0.3,
random_state=1234)

model = DecisionTreeClassifier(random_state=1234)
model.fit(train_X, train_y)
model.predict(test_X)
print('Train accuracy :',model.score(train_X, train_y))
print('Test accuracy :',model.score(test_X, test_y))
```

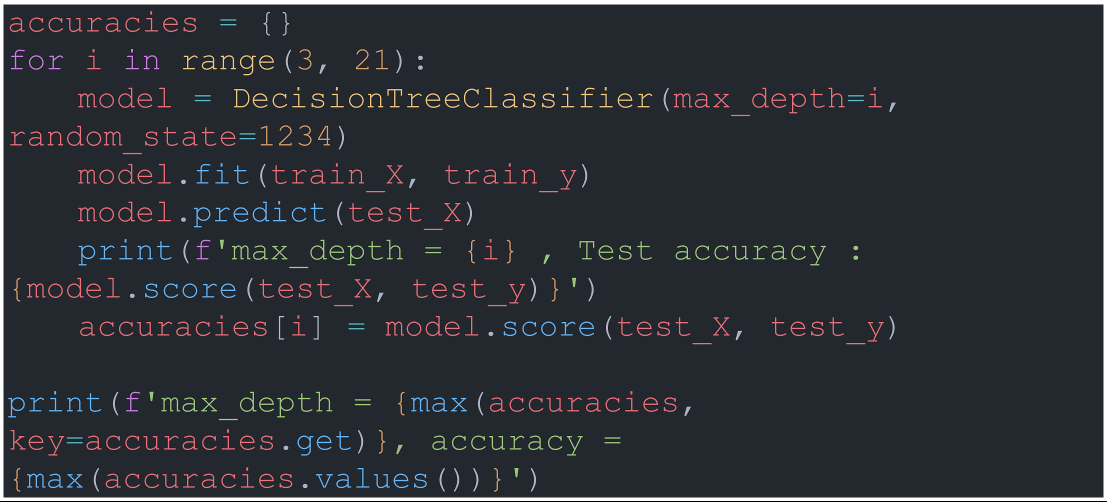
실행화면 캡처:



```
Train accuracy : 1.0
Test accuracy : 0.7012987012987013
```

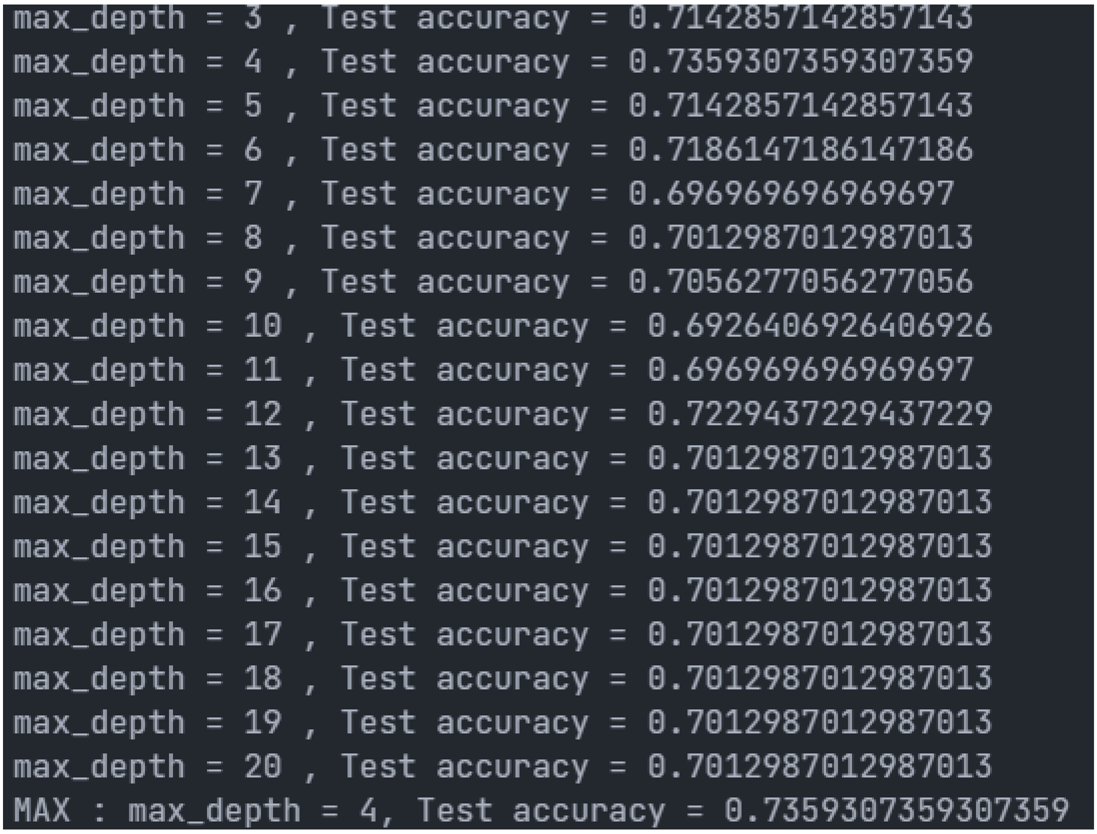
Q2 (4점) Q1 모델에서 DecisionTreeClassifier() 의 파라메터중 하나인 **max_depth**를 3~20까지 차례로 변화시킬 때, training/test accuracy 의 변화를 보이시오. test accuracy를 가장 크게하는 max_depth의 값과 이때의 test accuracy를 출력하시오.

Source code :



```
accuracies = {}
for i in range(3, 21):
    model = DecisionTreeClassifier(max_depth=i,
random_state=1234)
    model.fit(train_X, train_y)
    model.predict(test_X)
    print(f'max_depth = {i} , Test accuracy :
{model.score(test_X, test_y)}')
    accuracies[i] = model.score(test_X, test_y)

print(f'max_depth = {max(accuracies,
key=accuracies.get)}, accuracy =
{max(accuracies.values())}')
```

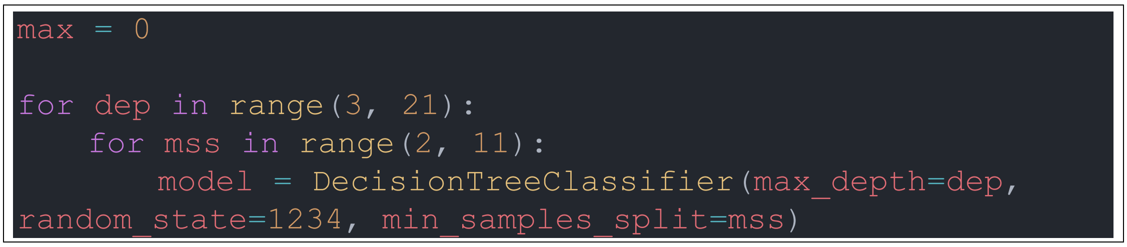
실행화면 캡처:



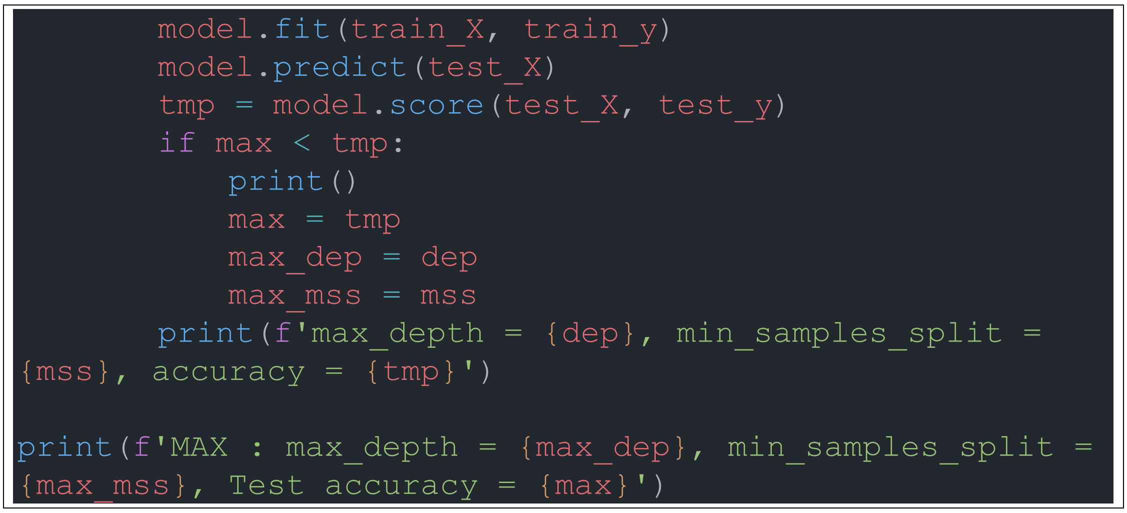
```
max_depth = 3 , Test accuracy = 0.7142857142857143
max_depth = 4 , Test accuracy = 0.7359307359307359
max_depth = 5 , Test accuracy = 0.7142857142857143
max_depth = 6 , Test accuracy = 0.7186147186147186
max_depth = 7 , Test accuracy = 0.696969696969697
max_depth = 8 , Test accuracy = 0.7012987012987013
max_depth = 9 , Test accuracy = 0.7056277056277056
max_depth = 10 , Test accuracy = 0.6926406926406926
max_depth = 11 , Test accuracy = 0.696969696969697
max_depth = 12 , Test accuracy = 0.7229437229437229
max_depth = 13 , Test accuracy = 0.7012987012987013
max_depth = 14 , Test accuracy = 0.7012987012987013
max_depth = 15 , Test accuracy = 0.7012987012987013
max_depth = 16 , Test accuracy = 0.7012987012987013
max_depth = 17 , Test accuracy = 0.7012987012987013
max_depth = 18 , Test accuracy = 0.7012987012987013
max_depth = 19 , Test accuracy = 0.7012987012987013
max_depth = 20 , Test accuracy = 0.7012987012987013
MAX : max_depth = 4, Test accuracy = 0.7359307359307359
```

Q2 (4점) Q1 모델에서 DecisionTreeClassifier() 의 파라메터중 하나인 **max_depth**를 3~20까지 차례로 변화시키고 **min_samples_split** 은 2~10까지 변화시킬 때 training/test accuracy 의 변화를 보이시오. test accuracy 의 값을 가장 크게 하는 두 파라메터의 조합과 이때의 test accuracy를 출력하시오.

Source code :

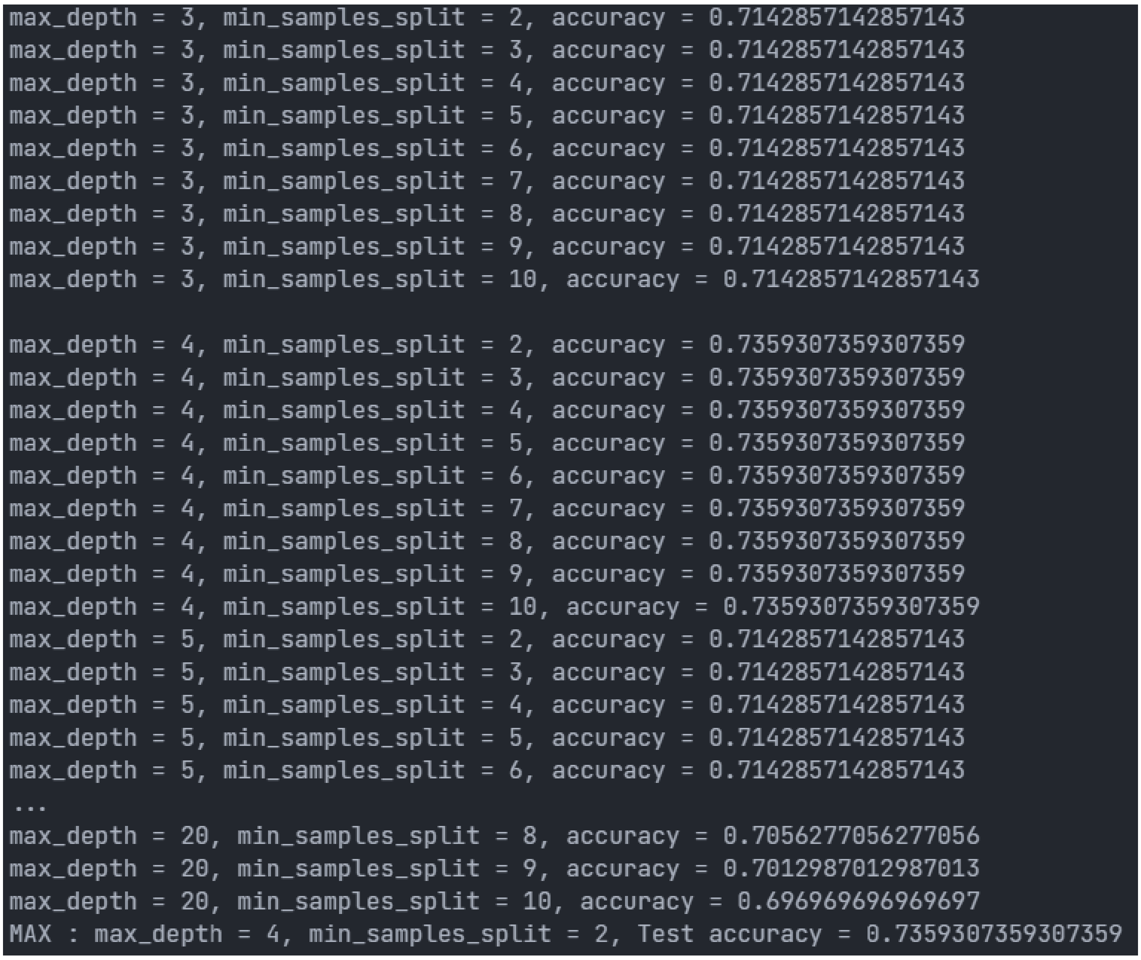


```
max = 0

for dep in range(3, 21):
    for mss in range(2, 11):
        model = DecisionTreeClassifier(max_depth=dep,
random_state=1234, min_samples_split=mss)
```



```
        model.fit(train_X, train_y)
        model.predict(test_X)
        tmp = model.score(test_X, test_y)
        if max < tmp:
            print()
            max = tmp
            max_dep = dep
            max_mss = mss
        print(f'max_depth = {dep}, min_samples_split = {mss}, accuracy = {tmp}')

print(f'MAX : max_depth = {max_dep}, min_samples_split = {max_mss}, Test accuracy = {max}')
```

실행화면 캡처:



```
max_depth = 3, min_samples_split = 2, accuracy = 0.7142857142857143
max_depth = 3, min_samples_split = 3, accuracy = 0.7142857142857143
max_depth = 3, min_samples_split = 4, accuracy = 0.7142857142857143
max_depth = 3, min_samples_split = 5, accuracy = 0.7142857142857143
max_depth = 3, min_samples_split = 6, accuracy = 0.7142857142857143
max_depth = 3, min_samples_split = 7, accuracy = 0.7142857142857143
max_depth = 3, min_samples_split = 8, accuracy = 0.7142857142857143
max_depth = 3, min_samples_split = 9, accuracy = 0.7142857142857143
max_depth = 3, min_samples_split = 10, accuracy = 0.7142857142857143

max_depth = 4, min_samples_split = 2, accuracy = 0.7359307359307359
max_depth = 4, min_samples_split = 3, accuracy = 0.7359307359307359
max_depth = 4, min_samples_split = 4, accuracy = 0.7359307359307359
max_depth = 4, min_samples_split = 5, accuracy = 0.7359307359307359
max_depth = 4, min_samples_split = 6, accuracy = 0.7359307359307359
max_depth = 4, min_samples_split = 7, accuracy = 0.7359307359307359
max_depth = 4, min_samples_split = 8, accuracy = 0.7359307359307359
max_depth = 4, min_samples_split = 9, accuracy = 0.7359307359307359
max_depth = 4, min_samples_split = 10, accuracy = 0.7359307359307359
max_depth = 5, min_samples_split = 2, accuracy = 0.7142857142857143
max_depth = 5, min_samples_split = 3, accuracy = 0.7142857142857143
max_depth = 5, min_samples_split = 4, accuracy = 0.7142857142857143
max_depth = 5, min_samples_split = 5, accuracy = 0.7142857142857143
max_depth = 5, min_samples_split = 6, accuracy = 0.7142857142857143
...
max_depth = 20, min_samples_split = 8, accuracy = 0.7056277056277056
max_depth = 20, min_samples_split = 9, accuracy = 0.7012987012987013
max_depth = 20, min_samples_split = 10, accuracy = 0.696969696969697
MAX : max_depth = 4, min_samples_split = 2, Test accuracy = 0.7359307359307359
```