assignment 17

March 8, 2022

1 Decision tree predicting the numerical column of body_mass_g in Penguins dataset

[2]:
```
import pandas as pd
import seaborn as sns
```

[3]:
```
from sklearn.tree import DecisionTreeRegressor
```

[4]:
```
from sklearn.model_selection import train_test_split
```

[5]:
```
from sklearn import tree
import graphviz

def plot_tree_regression(model, features):
    # Generate plot data
    dot_data = tree.export_graphviz(model, out_file=None,
                                    feature_names=features,
                                    filled=True, rounded=True,
                                    special_characters=True)

    # Turn into graph using graphviz
    graph = graphviz.Source(dot_data)

    # Write out a pdf
    graph.render("decision_tree")

    # Display in the notebook
    return graph
```

[6]:
```
penguins = sns.load_dataset("penguins")
penguins.head()
```

[6]:

	species	island	bill_length_mm	bill_depth_mm	flipper_length_mm	\
0	Adelie	Torgersen	39.1	18.7	181.0	
1	Adelie	Torgersen	39.5	17.4	186.0	
2	Adelie	Torgersen	40.3	18.0	195.0	
3	Adelie	Torgersen	NaN	NaN	NaN	

```
4  Adelie  Torgersen           36.7          19.3               193.0

   body_mass_g     sex
0       3750.0    Male
1       3800.0  Female
2       3250.0  Female
3          NaN     NaN
4       3450.0  Female
```

[7]:
```
penguins_model = penguins.dropna()
```

[8]:
```
penguins_train, penguins_test = train_test_split(penguins_model, test_size=0.3,␣
↪stratify=penguins_model['species'], random_state=42)
```

[9]:
```
features= ['bill_length_mm','flipper_length_mm']
dt_regression = DecisionTreeRegressor(max_depth = 3) # Increase max_depth to␣
↪see effect in the plot
dt_regression.fit(penguins_train[features], penguins_train['body_mass_g'])
```

[9]:
```
DecisionTreeRegressor(max_depth=3)
```

[10]:
```
def calculate_rmse(predictions, actuals):
    if(len(predictions) != len(actuals)):
        raise Exception("The amount of predictions did not equal the amount of␣
↪actuals")

    return (((predictions - actuals) ** 2).sum() / len(actuals)) ** (1/2)
```

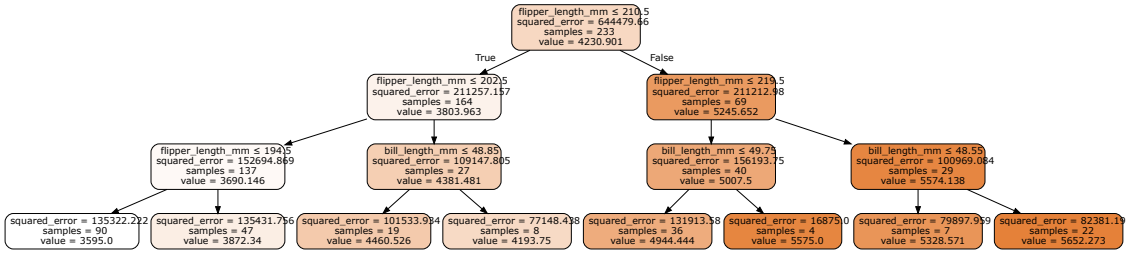
[11]:
```
predictionsOnTrainset = dt_regression.predict(penguins_train[features])
predictionsOnTestset = dt_regression.predict(penguins_test[features])

rmseTrain = calculate_rmse(predictionsOnTrainset, penguins_train.body_mass_g)
rmseTest = calculate_rmse(predictionsOnTestset, penguins_test.body_mass_g)

print("RMSE on training set " + str(rmseTrain))
print("RMSE on test set " + str(rmseTest))
```

```
RMSE on training set 348.37874508841065
RMSE on test set 403.8548465547442
```

The difference between the training set and the test set is approximately 50 grams. That is not a lot imo, since that means the model isn't to overfitted. Also, a RMSE of 400 grams where most penguins are approximately 3.5 to 5.5 kilos sounds about right as well.

[12]:
```
plot_tree_regression(dt_regression, features)
```

[12]:



The tree shows that the larger the flipper is, the heavier the penguin. Makes sense