Meeting 7

10/21/2021

Chisom Sopuruchi

Deliverables

- Epoch Detection Function

Methodology and Learnings

How I did it:
Implement the pseudocode

What I learnt on the way:
DecisionTreeRegressor class

Results

```python
# import library
import pandas as pd
# import class
from sklearn.tree import DecisionTreeRegressor

def decisionTree_epochDetection(num_bins,X,y):
    # exception handling
    # max_leaf_nodes must either be None or larger than 1
    # therefore num_bins must be at least 2
    if(num_bins < 2):
        print("num_bins must be greater than one")
        print("Changing value of num_bins to minimum possible value")
        num_bins = 2
    # fitting the regression tree X as features/predictor and y as label/target
    clf = DecisionTreeRegressor(max_leaf_nodes = num_bins).fit(X, y)

    # variables creation
    num_nodes = clf.tree_.node_count
    left_child = clf.tree_.children_left
    right_child = clf.tree_.children_right
    threshold = clf.tree_.threshold
    # list to store the bin edges
    bin_edges = [0,146884]

    # loop through all the nodes
    for i in range(num_nodes):
        # If the left and right child of a node is not the same(-1) we have an internal node
        # which we will append to bin_node list
        if left_child[i]!=right_child[i]:
            bin_edges.append(threshold[i])
    # sort the nodes in increasing order
    bin_edges.sort()
    # create dictionary to store epoch bin edges
    epoch_dict = {}
    # put in each dictionary index 2 consecutive bin edges
    for i in range(num_bins):
        epoch_dict[str(i+1)] = [bin_edges[i], bin_edges[i+1]]
    return epoch_dict
```

Results

```
#read eeg from 'log.csv'
biometric_dataframe = pd.read_csv('log.csv')
biometric_var = biometric_dataframe.Temp
time_index = biometric_dataframe.index
# convert to numpy 2D(X predictor) and 1D(y target) arrays
X = np.column_stack((time_index, biometric_var))
y = np.array(time_index)
num_bins = 10
print(decisionTree_epochDetection(num_bins,X,y))
```

```
uche@Boo-VirtualBox:~/Documents/SeniorDesign/functions$ python3 epoch_function.py
{'1': [0, 18359.5], '2': [18359.5, 36720.5], '3': [36720.5, 55080.5], '4': [55080.5, 64260.5], '5': [64260.5, 73441.5], '6': [73441.5, 91801.5],
 '7': [91801.5, 100981.5], '8': [100981.5, 110162.5], '9': [110162.5, 128522.5], '10': [128522.5, 146884]}
uche@Boo-VirtualBox:~/Documents/SeniorDesign/functions$
```