ECE 421 Programming Assignment Question

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**Part 3 Questions:**

**Part 3 Code:**

# Part 3 Question

def test\_Part3():

from sklearn.datasets import load\_iris

X\_train, y\_train = load\_iris(return\_X\_y = True)

X\_train, X\_test, y\_train, y\_test = train\_test\_split(X\_train[50:], y\_train[50:], test\_size = 0.2, random\_state = 1)

for i in range(80):

if y\_train[i] == 1:

y\_train[i] = -1

else:

y\_train[i] = 1

for j in range(20):

if y\_test[j] == 1:

y\_test[j] = -1

else:

y\_test[j] = 1

list = [(5, 5), (10, 10), (30, 10)]

for item in list:

NN = MLPClassifier(solver='adam', alpha=0.00001, hidden\_layer\_sizes=item, random\_state=1)

NN.fit(X\_train, y\_train)

NN\_pred = NN.predict(X\_test)

sciKit = confusion\_matrix(y\_test, NN\_pred)

NN\_pred = NN.predict(X\_train)

scikkit = confusion\_matrix(y\_train, NN\_pred)

print("For ", item)

print("Confusion Matrix for train data from Part 3 question is", scikkit)

print("Confusion Matrix for test data from Part 3 question is:", sciKit)

test\_Part3()

**Terminal Output:**

For (5, 5)

Confusion Matrix for train data from Part 3 question is [[42 0]

[38 0]]

Confusion Matrix for test data from Part 3 question is: [[ 8 0]

[12 0]]

For (10, 10)

Confusion Matrix for train data from Part 3 question is [[40 2]

[ 1 37]]

Confusion Matrix for test data from Part 3 question is: [[ 7 1]

[ 0 12]]

For (30, 10)

Confusion Matrix for train data from Part 3 question is [[39 3]

[ 0 38]]

Confusion Matrix for test data from Part 3 question is: [[ 7 1]

[ 1 11]]

**Training Accuracy:**

* (5, 5) training accuracy is 52.5%, test accuracy is 40%
* (10, 10) training accuracy is 96.25%, test accuracy is 95%
* (30, 10) training accuracy is 96.25%, test accuracy is 90%

**Confusion Matrix:**

* (5, 5)

|  |  |  |  |
| --- | --- | --- | --- |
| (5, 5) Training Confusion Matrix | | | |
|  | Predicted | | |
| Label |  | -1 | +1 |
| -1 | 42 | 0 |
| +1 | 38 | 0 |

|  |  |  |  |
| --- | --- | --- | --- |
| (5, 5) Testing Confusion Matrix | | | |
|  | Predicted | | |
| Label |  | -1 | +1 |
| -1 | 8 | 0 |
| +1 | 12 | 0 |

* (10, 10)

|  |  |  |  |
| --- | --- | --- | --- |
| (10, 10) Training Confusion Matrix | | | |
|  | Predicted | | |
| Label |  | -1 | +1 |
| -1 | 40 | 2 |
| +1 | 1 | 37 |

|  |  |  |  |
| --- | --- | --- | --- |
| (10, 10) Testing Confusion Matrix | | | |
|  | Predicted | | |
| Label |  | -1 | +1 |
| -1 | 7 | 1 |
| +1 | 0 | 12 |

* (30, 10)

|  |  |  |  |
| --- | --- | --- | --- |
| (30, 10) Training Confusion Matrix | | | |
|  | Predicted | | |
| Label |  | -1 | +1 |
| -1 | 39 | 3 |
| +1 | 0 | 38 |

|  |  |  |  |
| --- | --- | --- | --- |
| (30, 10) Testing Confusion Matrix | | | |
|  | Predicted | | |
| Label |  | -1 | +1 |
| -1 | 7 | 1 |
| +1 | 1 | 11 |