WuBenjaminAssignment6

April 2, 2022

1 CS156 (Introduction to AI), Spring 2022

2 Homework 6 submission

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2.1 Solution

2.2 Import libraries, setup random seed

[ ]:
```
import numpy as np
import copy
from sklearn import datasets
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.linear_model import Perceptron
from sklearn.metrics import plot_confusion_matrix
```

[ ]:
```
np.random.seed(42)
```

2.3 References and sources

List all your references and sources here. This includes all sites/discussion boards/blogs/posts/etc. where you grabbed some code examples.

2.4 Code the solution

[ ]:
```
mnist = datasets.load_digits()

X = mnist.data
Y = mnist.target

for i in range(len(X)):
    X[i] = X[i].astype("float32") / 255
```

[ ]:
```
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.2,␣
↪random_state=0, stratify=Y)
```

[ ]:
```
for i in range(10):
    Y_data = copy.deepcopy(Y_train)
    Y_tdata = copy.deepcopy(Y_test)
    for j in range(len(Y_data)):
        if Y_data[j] != i:
            Y_data[j] = 0
        else:
            Y_data[j] = 1
    for j in range(len(Y_tdata)):
        if Y_tdata[j] != i:
            Y_tdata[j] = 0
        else:
            Y_tdata[j] = 1

    model = Perceptron(tol=1e-3, random_state=0).fit(X_train, Y_data)

    title = ("Test set results for " + str(i) + " (" + str(round(model.
↪score(X_test, Y_tdata), 2)) + ")")
    labels = ["Not " + str(i), str(i)]
    disp = plot_confusion_matrix(model, X_test, Y_tdata,
                                 cmap=plt.cm.Greens)
    disp.ax_.set_title(title)
    disp.ax_.set_xticklabels(labels)
    disp.ax_.set_yticklabels(labels)
    plt.show()
```

```
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packages\sklearn\utils\deprecation.py:87: FutureWarning: Function
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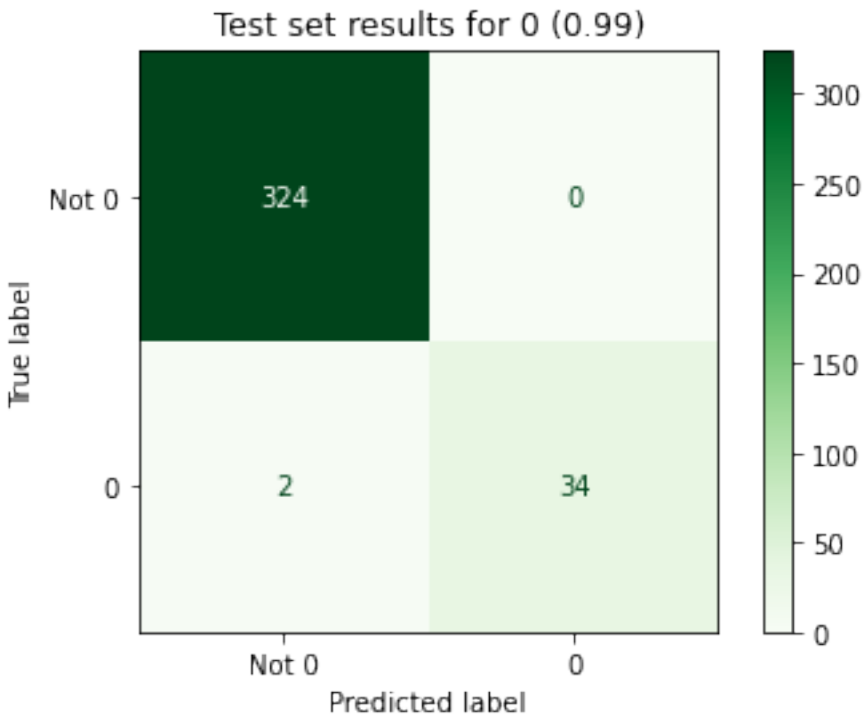


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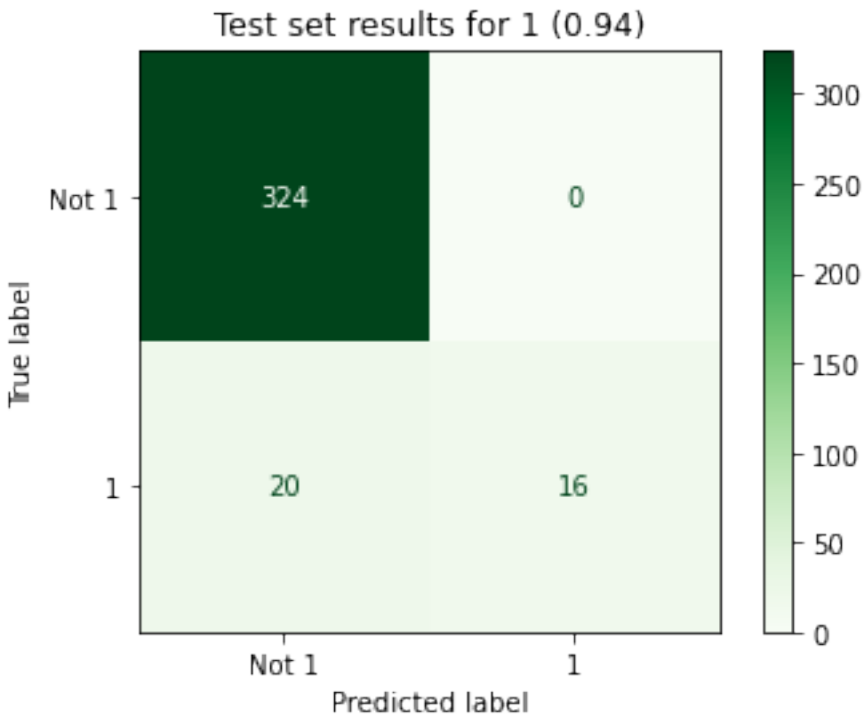


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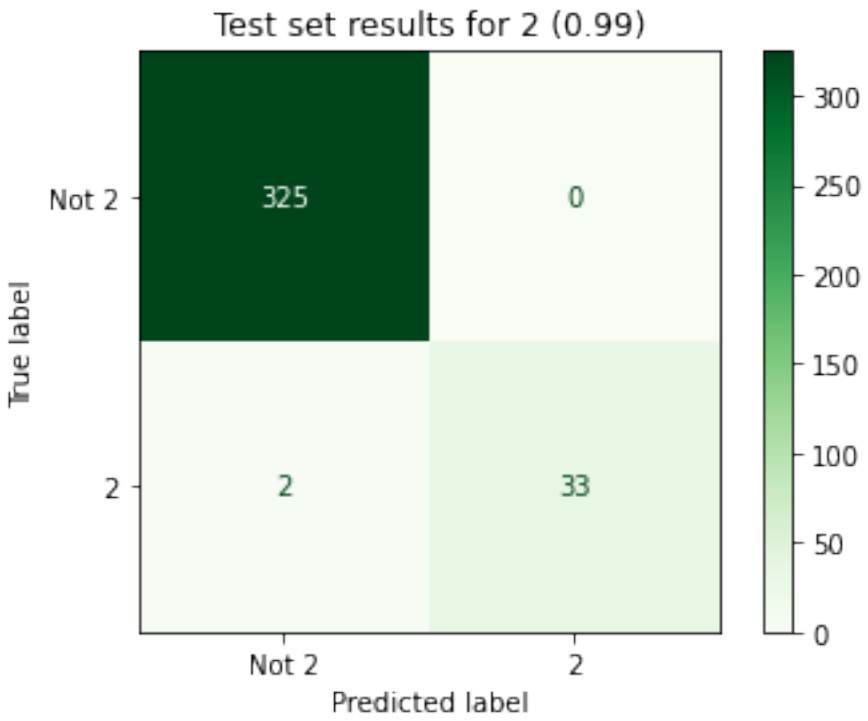


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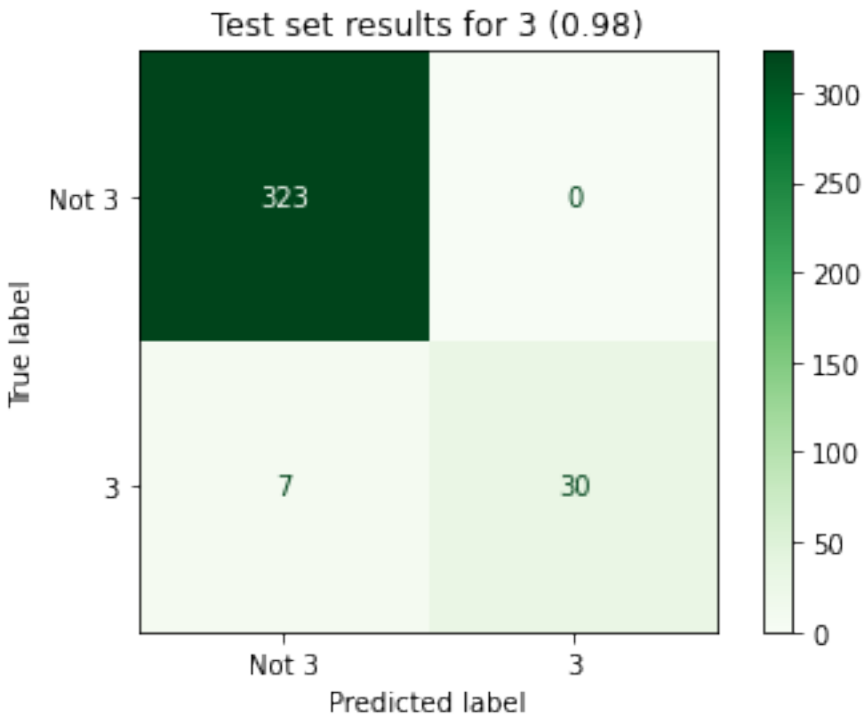


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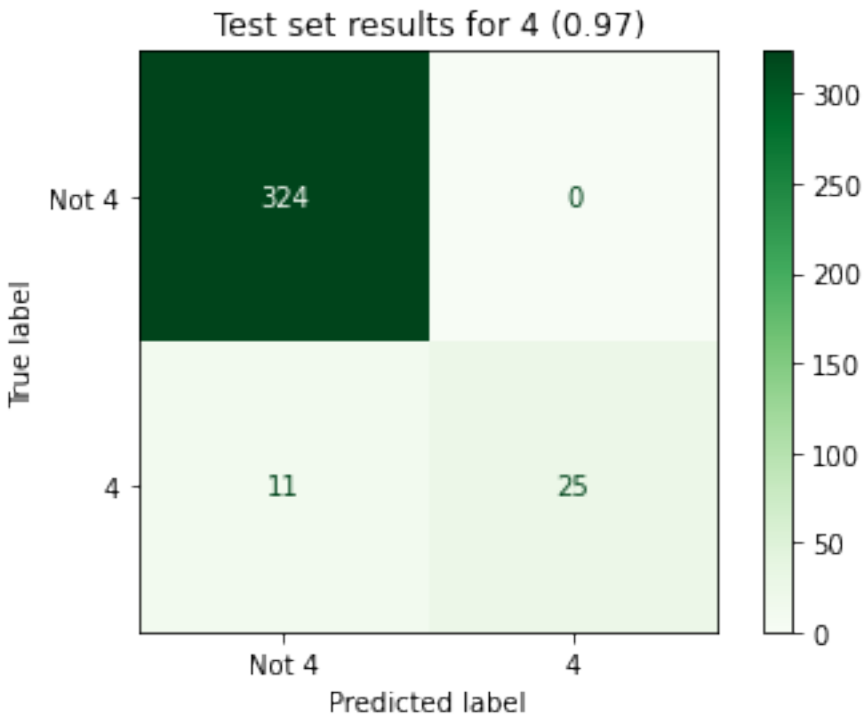


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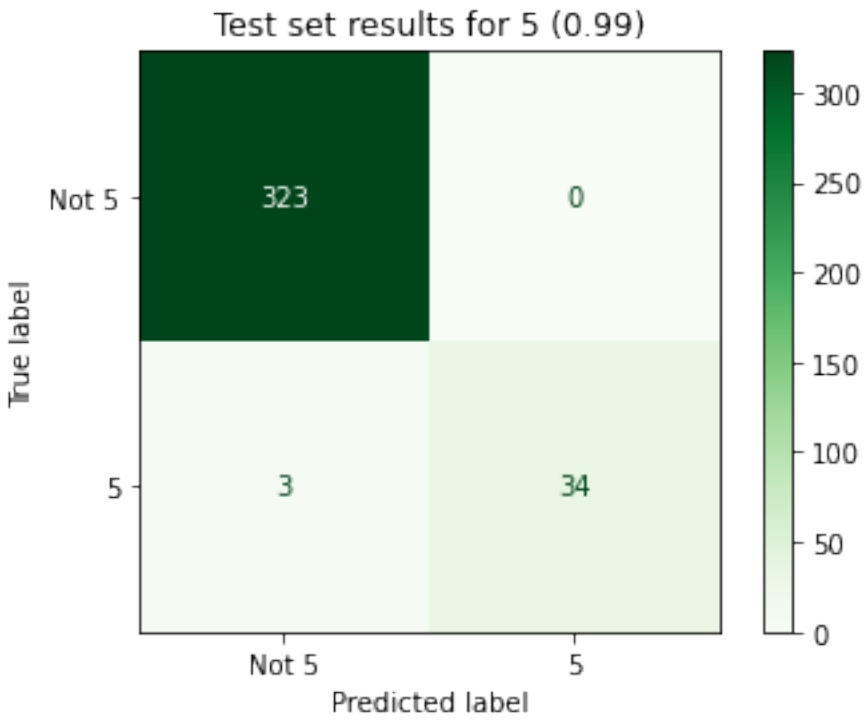


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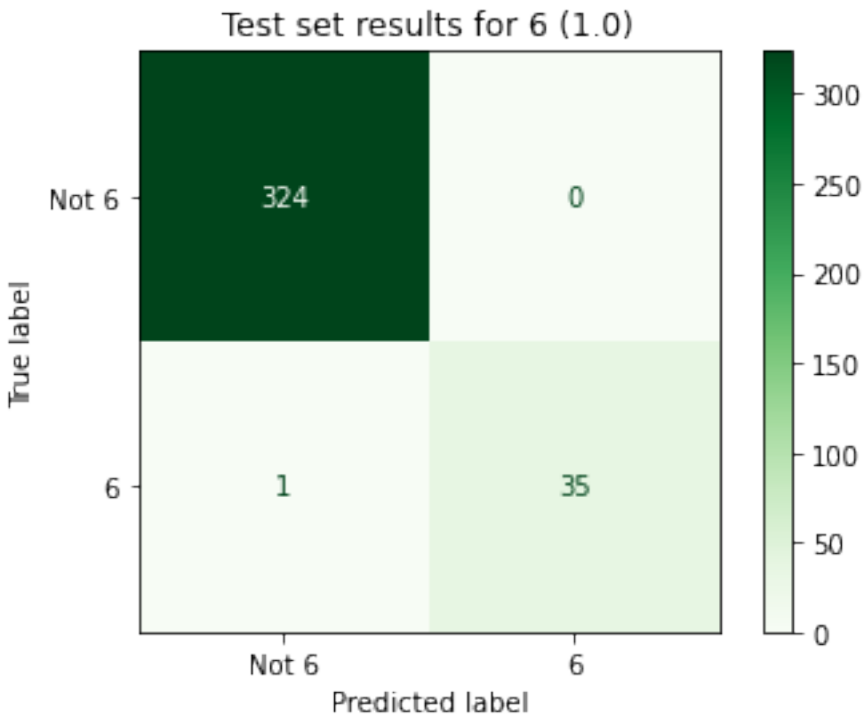


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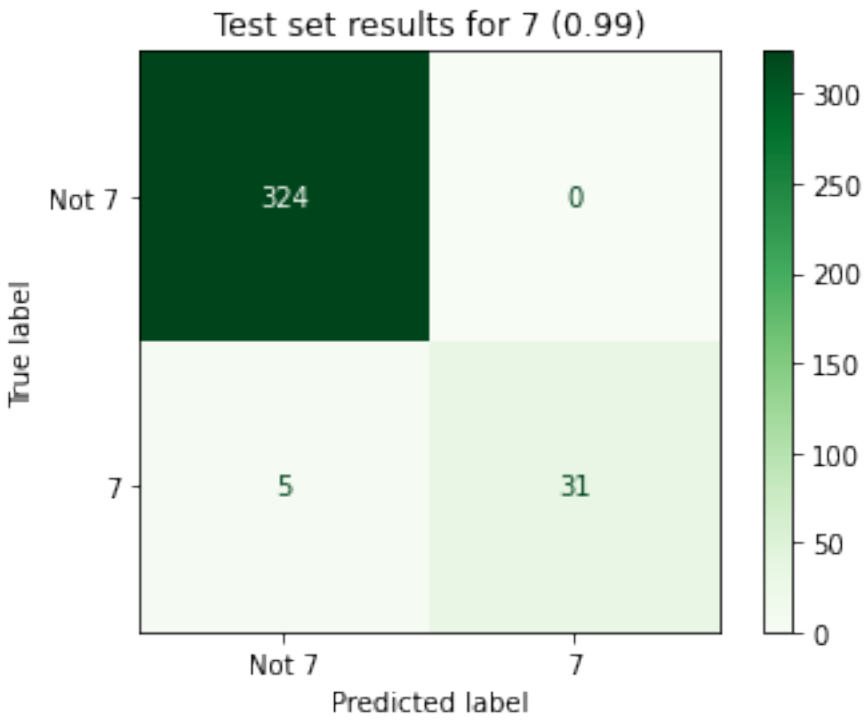


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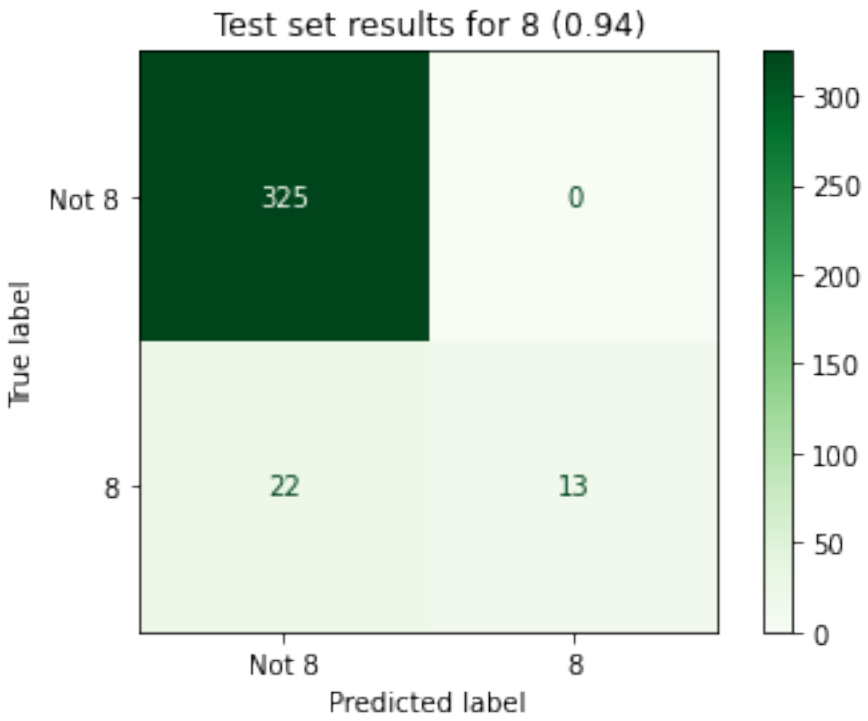


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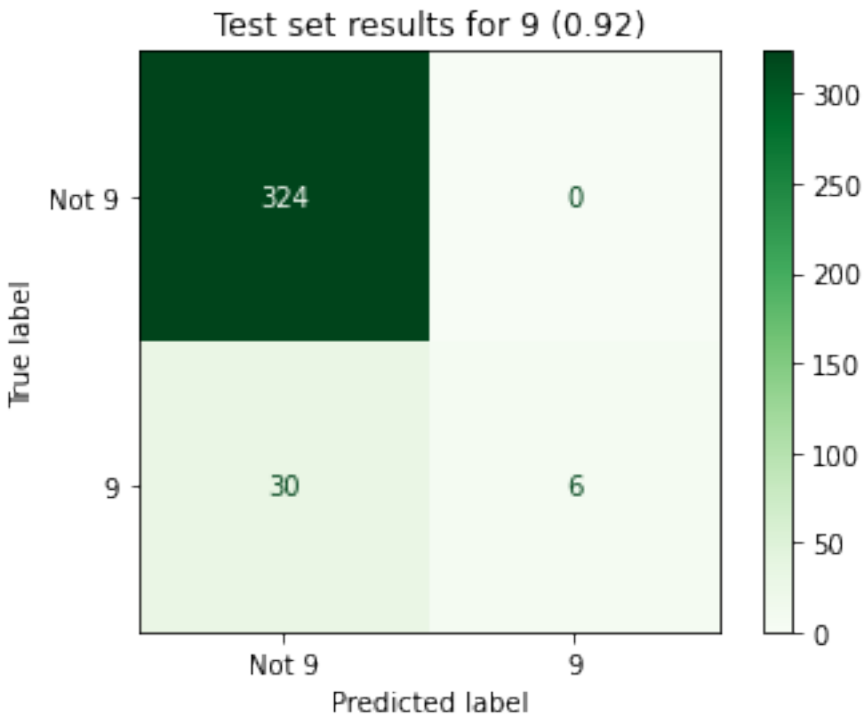
Test set results for 9 (0.92)
Not 9
9
True label
324
0
30
6
Not 9
9
Predicted label
300
250
200
150
100
50
0