learn-co-curriculum / dsc-visualizing-confusion-matrices-lab Public

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solution ···

This branch is 17 commits ahead, 16 commits behind master.

Cheffrey2000 fixed issues in code regarding regularization in the app... ... on Nov 19, 2021 18

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README.md

Visualizing Confusion Matrices - Lab

Introduction

In this lab, you'll build upon the previous lesson on confusion matrices and visualize a confusion matrix using `matplotlib` .

Objectives

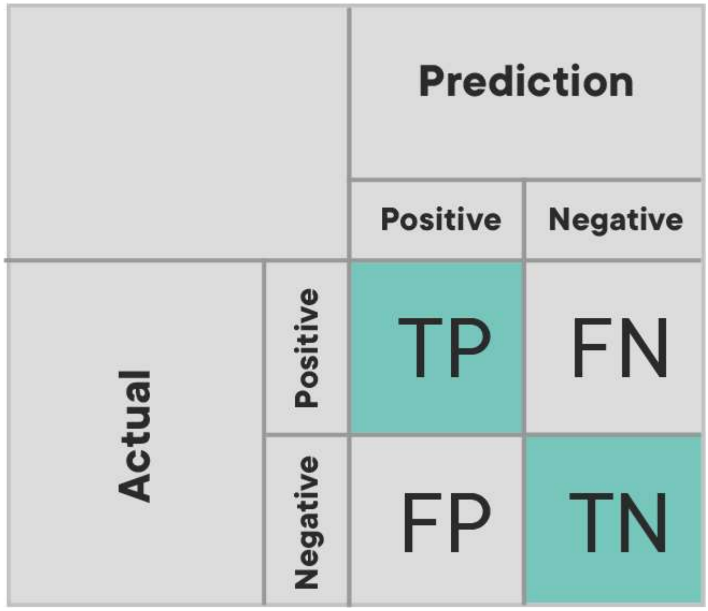
In this lab you will:

- Create a confusion matrix from scratch
- Create a confusion matrix using scikit-learn
- Craft functions that visualize confusion matrices

Confusion matrices

Recall that the confusion matrix represents the counts (or normalized counts) of our True Positives, False Positives, True Negatives, and False Negatives. This can further be visualized when analyzing the effectiveness of our classification algorithm.

Here's an example of how a confusion matrix is displayed:



		Prediction	
		Positive	Negative
Actual	Positive	TP	FN
	Negative	FP	TN

With that, let's look at some code for generating this kind of visual.

Create our model

As usual, we start by fitting a model to data by importing, normalizing, splitting into train and test sets and then calling your chosen algorithm. All you need to do is run the following cell. The code should be familiar to you.

```python
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.linear_model import LogisticRegression
from sklearn.model_selection import train_test_split

# Load the data
df = pd.read_csv('heart.csv')

# Define appropriate X and y
X = df[df.columns[:-1]]
y = df.target

# Split the data into train and test sets
X_train, X_test, y_train, y_test = train_test_split(X, y, random_state=0)
```

```
# Normalize the data
X_train = X_train.copy()
X_test = X_test.copy()

for col in X_train.columns:
    X_train[col] = (X_train[col] - min(X_train[col]))/ (max(X_train[col]) - min(X_tr

for col in X_test.columns:
    X_test[col] = (X_test[col] - min(X_test[col]))/ (max(X_test[col]) - min(X_test[c

# Fit a model
logreg = LogisticRegression(fit_intercept=False, C=1e12, solver='liblinear')
model_log = logreg.fit(X_train, y_train)

# Preview model params
print(model_log)

# Predict
y_hat_test = logreg.predict(X_test)

print("")
# Data preview
df.head()
```

```
LogisticRegression(C=1000000000000.0, fit_intercept=False, solver='liblinear')
```

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```

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	age	sex	cp	trestbps	chol	fbs	restecg	thalach	exang	ol
0	63	1	3	145	233	1	0	150	0	2.3
1	37	1	2	130	250	0	1	187	0	3.5
2	41	0	1	130	204	0	0	172	0	1.4

	age	sex	cp	trestbps	chol	fbs	restecg	thalach	exang	old
3	56	1	1	120	236	0	1	178	0	0.8
4	57	0	0	120	354	0	1	163	1	0.6

Create the confusion matrix

To gain a better understanding of confusion matrices, complete the `conf_matrix()` function in the cell below. This function should:

- Take in two arguments:
  - `y_true`, an array of labels
  - `y_pred`, an array of model predictions
- Return a confusion matrix in the form of a dictionary, where the keys are `'TP', 'TN', 'FP', 'FN'`

```
def conf_matrix(y_true, y_pred):
    cm = {'TP': 0, 'TN': 0, 'FP': 0, 'FN': 0}

    for ind, label in enumerate(y_true):
        pred = y_pred[ind]
        if label == 1:
            # CASE: TP
            if label == pred:
                cm['TP'] += 1
            # CASE: FN
            else:
                cm['FN'] += 1
        else:
            # CASE: TN
            if label == pred:
                cm['TN'] += 1
            # CASE: FP
            else:
                cm['FP'] += 1
    return cm

conf_matrix(y_test, y_hat_test)
```

```
{'TP': 38, 'TN': 26, 'FP': 7, 'FN': 5}
```

Check your work with `sklearn`

To check your work, make use of the `confusion_matrix()` function found in `sklearn.metrics` and make sure that `sklearn` 's results match up with your own from above.

- Import the `confusion_matrix()` function
- Use it to create a confusion matrix for `y_test` versus `y_hat_test` , as above

```
# Import confusion_matrix
from sklearn.metrics import confusion_matrix

# Print confusion matrix
cnf_matrix = confusion_matrix(y_test, y_hat_test)
print('Confusion Matrix:\n', cnf_matrix)
```

```
Confusion Matrix:
 [[26  7]
 [ 5 38]]
```

Create a nice visual

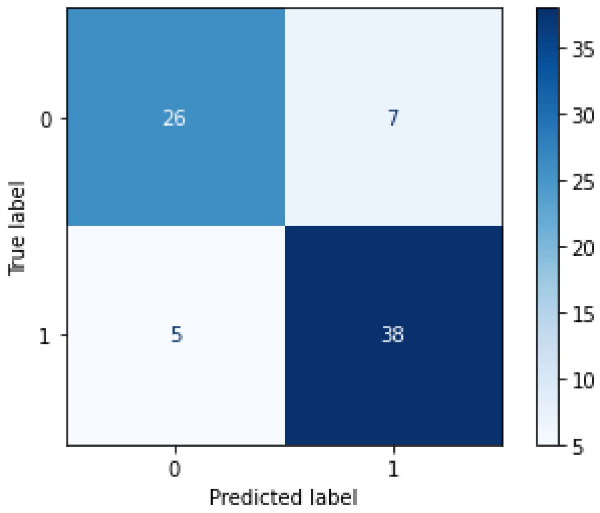
Luckily, sklearn recently implemented a `plot_confusion_matrix` function that you can use to create a nice visual of your confusion matrices.

Check out the documentation, then visualize the confusion matrix from your logistic regression model on your test data.

```
# Import plot_confusion_matrix

from sklearn.metrics import plot_confusion_matrix
```

```
# Visualize your confusion matrix
plot_confusion_matrix(logreg, X_test, y_test,
                     cmap=plt.cm.Blues)
plt.show()
```



Summary

Well done! In this lab, you created a confusion matrix from scratch, then explored how to use a new function to visualize confusion matrices nicely!

Releases

No releases published

Packages

No packages published

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Languages

● **Jupyter Notebook** 100.0%