edX

MITx: 6.86x
Machine Learning with Python-From Linear Models to Deep Learning

Help   sandipan_dey   ▾

7. Classification and Accuracy

Now we need a way to actually use our model to classify the data points. In this section, you will implement a way to classify the data points using your model parameters, and then measure the accuracy of your model.

Classification

1/1 point (graded)

Implement a classification function that uses θ and θ_0 to classify a set of data points. You are given the feature matrix, θ, and θ_0 as defined in previous sections. This function should return a numpy array of -1s and 1s. If a prediction is **greater than** zero, it should be considered a positive classification.

Available Functions: You have access to the NumPy python library as `np`.

Tip:: As in previous exercises, when x is a float, "$x = 1$" should be checked with $|x| < \epsilon$.

```
 1 def classify(feature_matrix, theta, theta_0):
 2     """
 3     A classification function that uses theta and theta_0 to classify a set of
 4     data points.
 5
 6     Args:
 7         feature_matrix - A numpy matrix describing the given data. Each row
 8             represents a single data point.
 9                 theta - A numpy array describing the linear classifier.
10         theta - A numpy array describing the linear classifier.
11         theta_0 - A real valued number representing the offset parameter.
12
13     Returns: A numpy array of 1s and -1s where the kth element of the array is
14     the predicted classification of the kth row of the feature matrix using the
15     given theta and theta_0. If a prediction is GREATER THAN zero, it should
16     be considered a positive classification.
```

Press ESC then TAB or click outside of the code editor to exit

Correct

Test results

Hide output

CORRECT

Test: classify greater than zero

Testing classifications with at least one prediction value > 0

Output:

```
Predictions are [ 1.  1. -1.  1.  1.]
Test Completed
```

Test: classify less than zero

Testing classifications with at least one prediction value < 0

Output:

```
Predictions are [-1.  1. -1.  1.  1.]
Test Completed
```

Test: classify zero

Testing classifications with at least one prediction value == 0

Output:

```
Predictions are [-1.  1.  1.  1.  1.]
Test Completed
```

Hide output

Submit   You have used 1 of 20 attempts

✔ Correct (1/1 point)

Accuracy

1/1 point (graded)
We have supplied you with an `accuracy` function:

```
def accuracy(preds, targets):
    """

    Given length-N vectors containing predicted and target labels,
    returns the percentage and number of correct predictions.
    """

    return (preds == targets).mean()
```

The `accuracy` function takes a numpy array of predicted labels and a numpy array of actual labels and returns the prediction accuracy. You should use this function along with the functions that you have implemented thus far in order to implement `classifier_accuracy`.

The `classifier_accuracy` function should take 6 arguments:

- a classifier function that, itself, takes arguments `(feature_matrix, labels, **kwargs)`

- the training feature matrix

- the validation feature matrix

- the training labels

- the valiation labels

- a `**kwargs` argument to be passed to the classifier function

This function should train the given classifier using the training data and then compute compute the classification accuracy on both the train and validation data. The return values should be a tuple where the first value is the training accuracy and the second value is the validation accuracy.

Implement classifier accuracy in the coding box below:

Available Functions: You have access to the NumPy python library as `np`, to `classify` which you have already implemented and to `accuracy` which we defined above.

```
1 def classifier_accuracy(
2         classifier,
3         train_feature_matrix,
4         val_feature_matrix,
```

```
 5          train_labels,
 6          val_labels,
 7          **kwargs):
 8      """
 9      Trains a linear classifier and computes accuracy.
10      The classifier is trained on the train data. The classifier's
11      accuracy on the train and validation data is then returned.
12
13      Args:
14          classifier - A classifier function that takes arguments
15              (feature matrix, labels, **kwargs) and returns (theta, theta 0)
```

Press ESC then TAB or click outside of the code editor to exit

Correct

Test results

Hide output

CORRECT

Test: classifier accuracy all correct

Testing accuracy when all prediction classifications are correct

Output:

```
Accuracy is (1.0, 1.0)
Test Completed
```

Test: classifier accuracy almost all correct

Testing accuracy when all but one prediction classifications are correct

Output:

```
Accuracy is (0.9, 0.9)
Test Completed
```

Test: classifier accuracy different train val

Testing accuracy when train and val sets have different results

Output:

```
Accuracy is (0.25, 0.5)
Test Completed
```

Test: classifier accuracy different train val pegasos

Testing accuracy when train and val sets have different results with pegasos

Output:

```
Accuracy is (0.25, 0.75)
Test Completed
```

Test: classifier accuracy half correct

Testing accuracy when half of prediction classifications are correct

Output:

```
Accuracy is (0.5, 0.5)
Test Completed
```

Test: classifier accuracy one correct

Testing accuracy when 1 prediction classification is correct

Output:

```
Accuracy is (0.1, 0.1)
Test Completed
```

Test: classifier accuracy zero correct

Testing accuracy when 0 prediction classifications are correct

Output:

```
Accuracy is (0.0, 0.0)
Test Completed
```

Hide output

Submit	You have used 1 of 20 attempts

✔ Correct (1/1 point)

Baseline Accuracy

3/3 points (graded)

Now, uncomment the relevant lines in **main.py** and report the training and validation accuracies of each algorithm with T = 10 and λ = 0.01 (the λ value only applies to Pegasos).

Please enter the **validation accuracy** of your Perceptron algorithm.

```
0.7160
```
✔

Please enter the **validation accuracy** of your Average Perceptron algorithm.

```
0.7980
```
✔

Please enter the **validation accuracy** of your Pegasos algorithm.

```
0.7900
```
✔

Submit	You have used 1 of 20 attempts

✔ Correct (3/3 points)

Discussion

Hide Discussion

Topic: Unit 1 Linear Classifiers and Generalizations (2 weeks):Project 1: Automatic Review Analyzer / 7. Classification and Accuracy

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💬 **A note on the classifier() call in classifier_accuracy: Python and first-class functions**

For folks new to Python or functional programming: In Python, one can store a reference to a function in a variable, and pass that function reference as an argument. The...

📌 Pinned   👤 Community TA   2

❓ **Validation accuracies are all the same - problem**   5

❓ **[STAFF] I passed grader , but on local machine it's showing error . I am attaching screenshots of only the outputs .**   5

💬 **Got all the code right yet the second part is all wrong..**

This is so frustrating.. Like before got all the code right, all the test right, yet the answers are marked wrong. There is no mention of why it is wrong. No debugging option. ...   1

❓ **Calculation time for Problem 7**

I have calculated Problem 7 for more than 3 hours, but I have not yet answered. How long does it usually take to solve Problem 7? Please tell me the standard.   8

💬 **[staff] Recommend accepting integers for classification results**

For two main reasons: 1) Because approximately everyone, in turn, is going to write their code to generate integer results, pass the local tests, and then get the big red ✖ ...

👤 Community TA   2

❓ **How to access "T" from kwargs?**

For the Perceptron algorithm, usually we iterate for a bit until the values for theta converge (if they do). I've been trying to get the value for T from **kwargs, so it does not...   5

💬 **[Staff] Grader problem (sort of)**

If we return from the classify function an array of integer -1s and 1s then the grader fails since it expects the output to be floating point. I thins the grader should be corre...   2

❓ **Problem with Pegasos accuracy in "Baseline Accuracy"**

Hi, I've implemented Pegasos algorithm correctly, and used it in the "Algorithm discussion" part of the Homework, getting correct results. Now, in the "Baseline Accuracy" ...   9

❓ **NotImplementedError Although all functions with correctly answered code drop by Grader are present in Project.py**

Im recieving NotImplementedError while running main.py for Question#7. All codes drops marked correct by grader are already updated in Project.py but im getting this ...   4

❓ **Accuracy - given PASS on local**

I got PASS on local computer. When I use the code here, functions such as perceptron are not part of the pre-loaded functions. My question is, I could implement all here ...   2

💬 **classifier_accuracy**

I correctly implemented the first part of the problem, and now I'm up to 'classifier_accuracy'. In this function there are tons of parameters, and I'm finding a hard time to o...   5

❓ **Accuracy: the supplied function doesn't work**

When I select an appropriate T and obtain a new theta in my preceptual as well as implement the labels I like the elect...