# 7. Classification and Accuracy

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Project due Oct 7, 2020 05:29 IST *Completed*

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.

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## Classification

1.0/1 point (graded)

Implement a classification function that uses $\theta$ and $\theta_0$ to classify a set of data points. You are given the feature matrix, $\theta$, and $\theta_0$ 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, "$x = 0$" should be checked with $|x| < \epsilon$.

```
def classify(feature_matrix, theta, theta_0):
    """
    A classification function that uses theta and theta_0 to classify a set of
    data points.

    Args:
        feature_matrix - A numpy matrix describing the given data. Each row
            represents a single data point.
                theta - A numpy array describing the linear classifier.
        theta - A numpy array describing the linear classifier.
        theta_0 - A real valued number representing the offset parameter.

    Returns: A numpy array of 1s and -1s where the kth element of the array is
    the predicted classification of the kth row of the feature matrix using the
    given theta and theta_0. If a prediction is GREATER THAN zero, it should
    be considered a positive classification.
```

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

Correct

## Test results

**See full output**

**CORRECT**

**See full output**

Submit You have used 2 of 25 attempts

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## Accuracy

1.0/1 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.

```
def classifier_accuracy(
        classifier,
        train_feature_matrix,
        val_feature_matrix,
        train_labels,
        val_labels,
        **kwargs):
    """
    Trains a linear classifier and computes accuracy.
    The classifier is trained on the train data. The classifier's
    accuracy on the train and validation data is then returned.

    Args:
        classifier - A classifier function that takes arguments
            (feature matrix, labels, **kwargs) and returns (theta, theta_0)
        train_feature_matrix - A numpy matrix describing the training
```

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

Correct

## Test results

**See full output**

**CORRECT**

**See full output**

Submit You have used 1 of 25 attempts

## 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 $\lambda$ = 0.01 (the $\lambda$ 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 3 of 20 attempts

## Discussion

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

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|---|---|---|
| ? | Baseline accuracy still wrong also after using given solutions<br>I would like to understand why running main.py and project1.py (using exactly the solutions given for each piece of code) I still do no... | 8 |
| | What's wrong with the accuracy of my code?<br>All my accuracy answers were counted wrong because my code gave me different values from what the expected answers were. My... | 1 |
| | Help please!<br>Hi everyone! I got graded correct for all functions, even for the "classifier_accuracy". I have used the correct theta and theta_0 to get ... | 7 |
| ? | Baseline accuracy: only perceptron validation wrong<br>I keep getting the perceptron validation accuracy wrong while the average perceptron validation accuracy and the pegasus validatio... | 6 |
| | Wrong answers for baseline accuracy<br>I got correct answers for the codes above but I am keep getting incorrect on the last question. In main.py, I ran all codes below Probl... | 17 |
| | help with classifier accuracy!!! pleeeeease<br>in my code i have: if classifier == perceptron: (theta, theta_0) = perceptron(.....) . . elif classifier == . . . this works on my computer and... | 1 new |
| ? | Classification<br>I got a full score when I first uploaded the answer, but main.py the answers were wrong when I uploaded them, so I sent the classific... | 3 |
| | [STAFF]: Can you help me with Baseline Accuracy?<br>Even though I have everything correct I can get Baseline Accuracy right. Can you help me? | 16 |
| ? | problem 7<br>When running the code in main.py for problem 7, I got this error: AttributeError: 'tuple' object has no attribute 'shape' The reason is ... | 1 |
| ? | Problems in the classifier_accuracy<br>I have the error bool object has no attribute mean. Why can it be caused? | 2 |
| | accuracy() function<br>The accuracy() function in project1.py has the following in the docstring: Given length-N vectors containing predicted and target labe... | 1 |
| ? | Baseline accuracy - takes an eternity to run. Any shortcut?<br>My code ran 2 hours with no result... It seems that my perceptron implementation is very slow. Maybe because of the use of ***np.... | 4 |
| | @Staff can you please check my code? Keep getting incorrect for validation accuracy<br>Sorry for posting twice. I really need to get this right to move on... I have done (1) used training sets for theta and theta_0 (2) put eps ... | 1 |

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