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Machine Learning with Python-From Linear Models to Deep Learning

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3. Activation Functions

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Project due Nov 5, 2020 05:29 IST *Completed*

The first step is to design the activation function for each neuron. In this problem, we will initialize the network weights to 1, use **ReLU** for the activation function of the hidden layers, and use an identity function for the output neuron. The hidden layer has a bias but the output layer does not. Complete the helper functions in `neural_networks.py`, including `rectified_linear_unit` and `rectified_linear_unit_derivative`, for you to use in the `NeuralNetwork` class, and implement them below.

You will be working in the file `part2-nn/neural_nets.py` in this problem

Correction note (Nov 1): In the `part2-nn/neural_nets.py`, in the definition of `Class NeuralNetwork()`, the initialization of weights has now been changed to an initialization as `float` rather than `int`. You could either re-download the updated project release [mnist.tar.gz](#), or change the corresponding lines in `part2-nn/neural_nets.py` to the following, where we have added decimal points to all numbers in the initialization:

```
class NeuralNetwork():

    def __init__(self):

        # DO NOT CHANGE PARAMETERS (Initialized to floats instead of ints)
        self.input_to_hidden_weights = np.matrix('1. 1.; 1. 1.; 1. 1.')
        self.hidden_to_output_weights = np.matrix('1. 1. 1.')
        self.biases = np.matrix('0.; 0.; 0.')
```

Rectified Linear Unit

2.0/2.0 points (graded)

First implement the ReLU activation function, which computes the ReLU of a scalar.

Note: Your function does not need to handle a vectorized input

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

```
1 def rectified_linear_unit(x):
2     """ Returns the ReLU of x, or the maximum between 0 and x."""
3     # TODO
4     if x > 0:
5         return x
6     else:
7         return 0
8
```

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

Correct

Test results

CORRECT

[See full output](#)

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Submit

You have used 2 of 50 attempts

Taking the Derivative

2.0/2.0 points (graded)

Now implement its derivative so that we can properly run backpropagation when training the net. Note: we will consider the derivative at zero to have the same value as the derivative at all negative points.

Note: Your function does not need to handle a vectorized input

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

```
1 def rectified_linear_unit_derivative(x):
2     """ Returns the derivative of ReLU."""
3     # TODO
4     if x<=0:
5         return 0
6     else:
7         return 1
```

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

Correct

Test results

CORRECT

[See full output](#)

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You have used 2 of 25 attempts

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💬 [25th Submission keeps processing](#)

17

[Dear staff, For Quest 2 on this page, its final submission 25th is not being taken even after correct grading for 24 submissions](#)

💬 [HINT: if grader processing for a long time](#)

1 new_

[Hi, The issue with the grader taking a long time to process the answer is related to the numeric type used in the comparison statem...](#)

? [Grader is continously processing for last 30 mins...for 2 question on this page.Please check for grader](#)

25

[Dear Staff, Grader is continuously processing for last 30 mins...for 2 question on this page.Please check for grader](#)

? [Strange behavior on RELU grader](#)

4

[For my code I can literally write "return True" and then the submission results say that my output is all "False" Similarly, I can try sub...](#)

💬 [Grader stuck at Processing](#)

3

[I have tried resetting, refreshing everything. Still its stuck at processing.](#)

✓	[Staff] Grader still has an issue. Hi Staff, The grader doesn't seem to work still. I have waited for more than 15 mins and nothing came out. Please extend the deadlin...	2
💬	Rectified Linear Unit - Processing Hi The program keeps processing; The grading process is still running. Refresh the page to see updates What is the solution for this?	6
?	WARNING! Don't use Numpy in the exercises on this page! There is some issue with Grader on this page. It turned to be complete idiot, incomparable in performance with Grader implementat...	3
💬	ReLU derivative at 0 Since the left-hand and right-hand limits are not equal at 0, the derivative at this point doesn't exist. However, we coded differently...	3
💬	A quotation mark is missing on the Correction note (Oct 26); a quotation mark and a space between the two last elements is missing, so instead of: <code>np.matrix('1...</code>	1
💬	There is a quote missing in the initialization <code>self.input_to_hidden_weights = np.matrix('1. 1.; 1. 1.; 1. 1.)</code> In case someone else faces this, in the <code>__init__(self)</code> the first line should be: <code>self.input_to_hidden_weights = np.matrix('1. 1.; 1. 1.; 1. 1...</code>	9
?	Isn't numpy.matrix deprecated?	2

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