Unit 8 - Week 5

Assignment 5

The due date for submitting this assignment has passed. Due on 2019-09-04, 23:59 IST.
As per our records you have not submitted this assignment.

Consider the cut section of a deep neural network as shown in the diagram given below. It can be seen that it has two inputs x_1 and x_2. From the figure, $z = w_1x_1 + w_2x_2 + b$, $z_1 = -z$, $z_2 = e^{z_1}$, $z_3 = z_2 + 1$ and $f = \frac{1}{z_3}$. If $[x_1, x_2] = [1, 2]$, the forward pass calculations give $[z, z_1, z_2, z_3, f] = [1, -1, 0.3679, 1.3679, 0.7311]$. The mathematical operations enclosed in the yellow rectangular box collectively represent the sigmoid function which is defined as $\sigma(z) = \frac{1}{1+e^{-z}}$ where $z = w_1x_1 + w_2x_2 + b$. Suppose that J represents error and it is known that $\frac{\partial J}{\partial f} = 1$.
Back propagating using chain rule

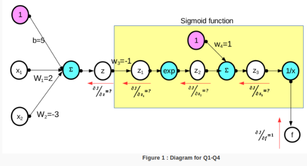

Figure 1 : Diagram for Q1-Q4

1) The value of $\frac{\partial J}{\partial z}$ is _____ ? **1 point**

Hint : $\frac{\partial \sigma(x)}{\partial x} = (1 - \sigma(x))\sigma(x)$

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.19,0.20

2) The value of $\frac{\partial J}{\partial z_3}$ is _____ ? **1 point**

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) -0.54,-0.53

3) The value of $\frac{\partial J}{\partial z_2}$ is _____? **1 point**

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) -0.54,-0.53

4) The value of $\frac{\partial J}{\partial z_1}$ is _____? **1 point**

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) -0.20,-0.19

5) Choose the correct combination of network weights for it to work as AND gate. The activation function is sigmoid $\varphi(x) = \frac{1}{1+e^{-x}}$ **1 point**

x_1	x_2	y
0	0	0
0	1	0
1	0	0
1	1	1

Table 1 : Data for Q5 & Q6

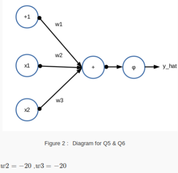

Figure 2 : Diagram for Q5 & Q6

$w1 = 30, w2 = -20 ,w3 = -20$

$w1 = -10, w2 = 20, w3 = 20$

$w1 = -30, w2 = 20, w3 = 20$

$w1 = 20, w2 = 10, w3 = -30$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$w1 = -30, w2 = 20, w3 = 20$

6) We repeat the previous problem with the network shown below. The initial weights and biases are $[w1, w2, w3] = [-1, -1, -1]$ and the cost function is MSE. For a gradient descent based learning, which of the following would be the ``worst" choice of activation function? **1 point**

$\varphi = sin(x)$

$\varphi = \frac{1}{1+e^{-x}}$

$\varphi = max(0, x)$

$\varphi = tanh(x)$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\varphi = max(0, x)$

7) Which of the following statements are true for sigmoid and softmax functions? **1 point**

In the logistic regression model, sigmoid is used for binary classification while softmax is used for multi classification problems.

The sum of output values may or may not be equal to one for softmax function

The sigmoid function accounts only for the weighted sum of inputs.However, the softmax function accounts not only for the weighted sum of the inputs, but also for the inputs to the other output nodes

The sum of output values is equal to one for softmax function

No, the answer is incorrect.
Score: 0
Accepted Answers:
In the logistic regression model, sigmoid is used for binary classification while softmax is used for multi classification problems.
The sigmoid function accounts only for the weighted sum of inputs.However, the softmax function accounts not only for the weighted sum of the inputs, but also for the inputs to the other output nodes
The sum of output values is equal to one for softmax function

8) Considering the figure given below, which of the following are true?(Assume no hidden units in classifier) **1 point**

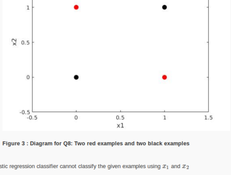

Figure 3 : Diagram for Q8: Two red examples and two black examples

A logistic regression classifier cannot classify the given examples using x_1 and x_2

A logistic regression classifier can classify the given examples using x_1 and x_2

Even on including extra nonlinear features (like x_1^2, x_1x_2, x_2^2), a logistic regression classifier cannot classify the given examples

On including extra nonlinear features (like x_1^2, x_1x_2, x_2^2), a logistic regression classifier can classify the given examples

No, the answer is incorrect.
Score: 0
Accepted Answers:
A logistic regression classifier cannot classify the given examples using x_1 and x_2
On including extra nonlinear features (like x_1^2, x_1x_2, x_2^2), a logistic regression classifier can classify the given examples

For the neural network shown below, the activation function is sigmoid and cost function is binary cross entropy. The weights and biases are initialized to 1. Answer the following questions:

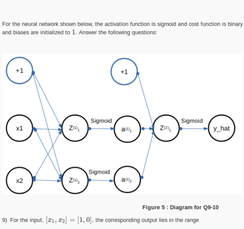

Figure 5 : Diagram for Q9-10

9) For the input, $[x_1, x_2] = [1, 0]$, the corresponding output lies in the range **1 point**

$[0.84, 0.85]$

$[0.94, 0.95]$

$[0.99, 1.0]$

$[0.89, 0.9]$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$[0.94, 0.95]$

10)Consider the data given below. For which of the training examples will the outputs be identical? **1 point**

x_1	x_2	y
0	0	0
0	1	1
1	0	1
1	1	0

Table 2 : Data for Q10

1^{st} and 2^{nd}

2^{nd} and 3^{rd}

3^{rd} and 4^{th}

4^{th} and 1^{st}

No, the answer is incorrect.
Score: 0
Accepted Answers:
2^{nd} and 3^{rd}