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**Q1**

This is a binary classification problem:

* A 2-layer neural network as shown in Figure 1, is used for the binary classification.
* The data in the table is used for the training of the neural network. y has two values (0 or 1), and x (feature) has three dimensions.
* The initial value of the parameters of the neural network are as follows:

, = ,, = ,

* The neurons in the hidden layer use the following **ReLU** function as the activation function.
* The neurons in the output layer use the sigmoid function as the activation function.
* Learning rate is 1 in the training.

After the first iteration of the backpropagation in the training, what is the value of (is the first element in the first row of )?

Calculation process and formulars must be included in your answer!

|  |  |  |  |
| --- | --- | --- | --- |
| x | | | y |
| x1 | x2 | x3 |
| 1 | -1 | 1 | 1 |
| -1 | 1 | 0 | 0 |

Diagram

Description automatically generated

Figure 1

Backpropagation:

Q2.

For following sample data, what is the fitting straight line?

• Please use **Gradient Descent** for linear regression in this question.

• The initialization is: w = 0, b = 0, Learning rate is: 𝛼= 0.04.

• The regression should stop after two iterations.

Calculation process and formulars must be included in your answer!

|  |  |
| --- | --- |
| X | Y |
| 1 | 5 |
| 2 | 12 |
| 3 | 18 |

,

is the best fitting line