CSAL4243

Introduction to Machine Learning

Quiz 4

1. In a neural network, a neuron after computation has value $z_1 = \theta^T X$ = -47 and another neuron $z_2 = \theta^T X = 234$. Compute the output $a_1 = g(z_1)$ and $a_2 = g(z_2)$ after activation when activation function is logistic/sigmoid and when it is ReLU.

Sigmoid: $a = g(z) = \frac{1}{1+e^{-z}}$

$a_1 = g(z_1)$ = g(-47) ~ 0

$a_2 = g(z_2)$ = g(234) ~ 1

ReLU: $a = g(z) = max(0, z)$

$a_1 = g(z_1)$ = g(-47) = 0

$a_2 = g(z_2)$ = g(234) = 234

2. Mention one use of each layer in CNN given below.
    a. Convolution layer

    Ans: Find features/patterns in images/data.

    b. Pooling layer

    Ans: Reduce number of parameters in network by reducing size of layer.

    c. Fully connected layer

    Ans: Take all neurons in previous layer as input.

3. Which of the two networks is a better choice for CNN and why.
    a. A network with 3 convolutional layers with each layer having 100 filters.
    b. A network with 5 convolutional layers with each layer having 50 filters.

    Ans: (b) since deep network (network with more layers) will have more advanced features, hence better prediction.

4. In CNN, layer3 has dimension 20x20x8 and layer4 has dimension 20x20x10 after convolution with filters of size 5x5x8. Answer following.
    a. Number of filters used

    Ans: 10 resulting in depth of 10 in layer4.

b. Stride and pooling value (its padding not pooling)

Ans: stride is 1 and padding of 2. [Everyone will receive marks for this question and those who either mentioned as pooling of 1x1 or that it cant be computed or that it should be padding will receive 1 extra mark.