



Subject: Machine Learning Techniques
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Assignment-4

1. Calculate the output y of a three-input neuron with bias. The input feature vector is $(x_1, x_2, x_3) = (0.8, 0.6, 0.4)$ and weight values are $[w_1, w_2, w_3, b] = [0.2, 0.1, -0.3, 0.35]$. Use binary Sigmoid function as activation function. (KCS-055.4, K3)
2. List the appropriate problems for neural networking. Describe derivation of the back propagation rule. Discuss the working of feed forward neural network. (KCS-055.4, K2)
3. What is Self-Organizing Map (SOM). Construct KSOM cluster for the given vector $[0 \ 0 \ 1 \ 1]$, $[1 \ 0 \ 0 \ 0]$, $[0 \ 1 \ 1 \ 0]$ and $[0 \ 0 \ 0 \ 1]$. Consider number of clusters = 2, Assume initial learning rate 0.6. (KCS-055.4, K3)
4. Why do we prefer Convolutional Neural networks (CNN) over Artificial Neural networks (ANN) for image data as input? Can we use CNN to perform Dimensionality Reduction? If yes, then which layer is responsible for dimensionality reduction particularly in CNN? (KCS-055.4, K2)
5. Consider input matrix $A = \begin{bmatrix} 5 & 5 & 3 & 2 & 1 \\ 0 & 0 & 0 & 2 & 2 \\ 3 & 2 & 4 & 5 & 0 \\ 0 & 3 & 2 & 1 & 0 \\ 2 & 3 & 4 & 0 & 1 \end{bmatrix}$ kernel $= \begin{bmatrix} 0 & 1 & 2 \\ 2 & 2 & 0 \\ 0 & 1 & 3 \end{bmatrix}$ Show convolution operation with strides 1 and 2, with and with-out padding, maximum pooling and Flattening layer outcome. (KCS-055.4, K3)