Test-3

m is the number of training example, **n** is the number of features in each training example, **C** is the number of clusters in which training examples are grouped into..

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# Training Examples ( m, n )
T =  [ [ 1, 1, 0, 0 ], [ 0, 0, 0, 1 ], [ 1, 0, 0, 0 ], [ 0, 0, 1, 1 ] ]
 m, n = len( T ), len( T[0] )
   # weight initialization ( n, C )
weights = [ [ 0.2, 0.6, 0.5, 0.9 ], [ 0.8, 0.4, 0.7, 0.3 ] ]
 alpha = 0.5
```

When fourth training example is given first, find

i. Distance of 4^{th} training example to output nodes
ii. Which one is winning node
iii. Find new weights of the wining node [2+1+2=5M]

Number of one dimensional data samples to RBFN is 100, maximum distance between two data points is 5.0, number of hidden nodes are 50. If input of 0.5 is given to RBFN node-5 having centre at 0.1, calculate (i) spread factor beta (ii) the activation function at node-5.
[1+2=3M]

Part of CONVNET for CIFAR-10 is : 227x227x3(input image) → (Conv1: 11x11, s=4, k=96, bias present)→A→pool : 3x3, s=2 →B→(Conv2: 5x5,p=2,s=1, k=256, bias absent)→C……→Last layer

(i) Size of A
(ii) Size of B
(iii) Size of C
(iv) Number of parameters to learn in CONV-1
(v) Number of parameters to learn in Pool-1
(vi) Number of parameters to learn in CONV-2
(vii) Activation function at last layer [7M]

One dimensional predicted output y_t of RNN cell is Relu(net). If element values of bias, weights, two dimensional h_t vector are all 0.1, calculate (i) net (ii) y_t [1+2=3M]

Capital letter L and H represented in 3x3 pixel matrix (presence of pixel is +1, absence is -1), and read as reading from topmost left corner and scanning left to right are to be stored in Hopfield network. (i) What is the size of weight matrix (ii) Value of W42 (iii) Value of W97 [1+1+1=3M]

If epsilon in the epsilon-greedy approach in reinforcement learning is 30%, what is the probability of choosing to exploit? [1M]

If previous hidden state output in GRU is 0.75, and output of update Gate is unity, what will be the value of current hidden state? [1M]

What term in deep learning refers to ignoring certain set of neurons which is chosen at random during the training phase. [1M]

Consider two fuzzy sets A = {1/1 + 0.6/2 + 0.3/3} and B = {0.5/2 + 0.7/3 + 0.2/4}. Compute (i) A+B_bar, (ii) B.A_bar (where bar implies complement) [2+2=4M]

A function y=f(x1, x2)= 2*x1+3*x2+4 can also be represented as a fuzzy relation. True/False?

[1M]

Who is called the father of fuzzy logic? [1M]

Ans. 1 (i) $d_1 = (0-.2)^2 + (0-.6)^2 + (1-.5)^2 + (1-.9)^2 = 0.66 / \sqrt{d_1} = .8124$ (1)

$d_2 = (0-.8)^2 + (0-.4)^2 + (1-.9)^2 + (1-.3)^2 = 1.38 / \sqrt{d_2} = 1.17$ (1)

(ii) Node 1 is winner

(iii)
$$w_{11} = 0.2 + 0.5(0-0.2) = 0.1$$
$$w_{21} = 0.6 + 0.5(0-0.6) = 0.3$$
$$w_{31} = 0.5 + 0.5(1-0.5) = 0.75$$
$$w_{41} = 0.9 + 0.5(1-0.9) = 0.95$$
(2)

Ans. 2 (i) $\beta = \frac{M}{d_{max}^2} = \frac{50}{25} = 2$ (1M) (ii) $\phi_5(x) = \exp\left(-2(.5-.1)^2\right) = 0.7261$ (2M)

Ans. 3 (i) $55 \times 55 \times 96$ (ii) $27 \times 27 \times 96$ (iii) $27 \times 27 \times 256$ (iv) $(3 \times 11 \times 11 + 1)96 = 34944$

(v) Zero (vi) $96 \times 5 \times 5 \times 256 = 614400$ (vii) Softmax (1)

Ans. 4 $net = w_y h_t + b = \begin{pmatrix} 0.1 & 0.1 \end{pmatrix} \begin{pmatrix} 0.1 \\ 0.1 \end{pmatrix} + 0.1 = 0.12$ (1)

$y_t = Relu(net) = 0.12$ (2)

Ans. 5 (i) 9×9 (ii) $w_{42} = -2$ (iii) $w_{97} = 2$ (3)

Ans. 6 70 %.

Ans. 7 0.75

Ans 8 Dropout

9.) $A = \left\{ \frac{1}{1} + \frac{0.6}{2} + \frac{0.3}{3} \right\}$, $B = \left\{ \frac{0.5}{2} + \frac{0.7}{3} + \frac{0.2}{4} \right\}$

$A + \bar{B} = ?$

$B \cdot \bar{A} = ?$

$A = \left\{ \frac{1}{1} + \frac{0.6}{2} + \frac{0.3}{3} + \frac{0}{4} \right\}$

$B = \left\{ \frac{0}{1} + \frac{0.5}{2} + \frac{0.7}{3} + \frac{0.2}{4} \right\}$

$\therefore \bar{A} = \left\{ \frac{0}{1} + \frac{0.4}{2} + \frac{0.7}{3} + \frac{1}{4} \right\}$

$\bar{B} = \left\{ \frac{1}{1} + \frac{0.5}{2} + \frac{0.3}{3} + \frac{0.8}{4} \right\}$.

$\therefore A + \bar{B} = \left\{ \frac{1}{1} + \frac{0.6}{2} + \frac{0.3}{3} + \frac{0.8}{4} \right\}$ Ans. (2M)

$B \cdot \bar{A} = \left\{ \frac{0}{1} + \frac{0.4}{2} + \frac{0.7}{3} + \frac{0.2}{4} \right\}$ Ans. (2M)

10.) False (Crisp relation) (1M)

11.) Prof. L.A. Zadeh. (1M)