BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI

Neural Networks & Fuzzy Logic BITS F312 [2nd Semester, 2018-2019]

Comprehensive Exam. - Part A (Closed Book)

Max. Time: 45 min Max. Marks: 45 Date: 10.5.2019

Name: **Id. No.**:

Q1. In Type-2 fuzzy sets, membership values are crisp or fuzzy? _____ [1]

Q2. Which learning algorithm and which inference method are used in ANFIS? [2]

_____ and _____

Q3. Clustering is a supervised/unsupervised problem? _____ [1]

Q4. What constraint is satisfied in Fuzzy C-Means algorithm?

_____ [1]

Q5. Which one between Roulette-wheel and Ranking selections maintains a better exploration-exploitation balance in GA? _____ [1]

Q6. The max-min composition of the two fuzzy relation matrices $\begin{bmatrix} 0.7 & 0.4 \\ 0.1 & 1.0 \end{bmatrix}$ and $\begin{bmatrix} 0.8 & 0.0 \\ 0.5 & 0.9 \end{bmatrix}$ is given by

_____ [3]

Q7. The main limitation of a conventional PID controller as compared to a fuzzy PID controller is

_____ [1]

Q8. The output of the fuzzy system in a fuzzy-PID type controller is considered as the incremental control signal Δu. Is it a fuzzy-PI or a fuzzy-PD or a fuzzy-PID controller? _____ [2]

Q9. The inputs of a two-term fuzzy PID controller are _____ whereas those of a three-term fuzzy PID controller are _____ [2]

Q10. Markov Decision Process describes environment for what type of learning? _____ [1]

Q11. Connections between the input layer and the only hidden layers are not weighted in which kind of network?

_____ [1]

Q12. Name the network which is an example of autoassociative memory with feedback. _____ [1]

Q13. Both the ReLU and this activation function named 'A' are largely similar, except near 0 where 'A' is enticingly smooth and differentiable.

(a) Name of 'A' = _____ (b) Expression of 'A' = _____ [2]

Q14. Write the terms to (a) Expresses the ability to find all relevant instances in a dataset, (b) Expresses the proportion of the data points our model says was relevant actually were relevant.

(a) _____ (b) _____ [2]

Q15. Name the two gates that are used in GRU:

(1) _____ (2) _____ [2]

Q16. A grey scale 32x32 image is convolved with Six 5x5 kernel, bias present, no padding, stride =1 [1+1+1+2=5]

(a) Size of output image : _____ (b) No. of parameters to be learnt : _____

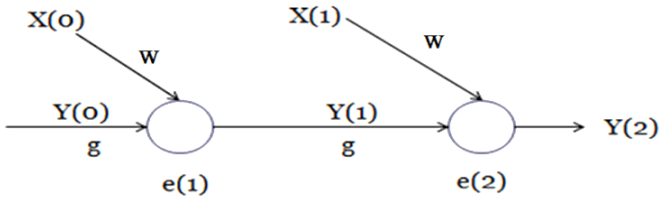
(c) No. of connections/convolution operators : _____

(d) No. of parameters to be learnt if network is fully connected from 32x32 to output image size of part (a) _____

Q17. CNN has applied Six 5x5 filters with stride=1, padding=0 on an RGB image of size NxN. Resultant is a single pixel image. What is the original dimension of image? [3]

_____

Q18. For the unfolded RNN given below,



Activation function is ReLU. e(2)=-0.1, e(1)=-0.2, Y(2)=X(1)=0.5, Y(1)=X(0)=0.4, Y(0)= 0.2, all intial weights are 0.1, learning rate is 0.01. Find the values of [1.5x4=6]

(a) δ_2= _____ (b) δ_1= _____ (c) Δw_2 = _____ (d) Δg_1 = _____

Q19. At a particular point, 5x5 sized Q matrix is having only diagonal elements as 10, others zero. Self-loop rewards are equal to 10. Discount factor is 0.6. Reward for (state, action) pair (1,2),(1,3),(1,4),(1,5)=4; for (2,1),(2,4)=4; for (3,1),(3,4)=4; for (4,1),(4,2),(1,5)=4; for (5,1)=4. Other pairs not connected.

(a) Write the complete expression for calculating Q(5,1). (b) Find the value of Q (5,1). [3]

Q20. Out of sample of 100 cases, 50 are healthy and the others are patient of Blood Sugar (BS). [5]

Scenario 1: Test is positive for all patients of BS and negative for all the healthy ones. Accuracy : _____

Scenario 2: If the test can only diagnose 25 out of the 50 patients of BS and has reported the others as healthy,

Sensitivity: _____ Specificity: _____

Is this test good for screening or confirmation of BS? Good for _____ Not good for _____

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