



Introduction to Soft Computing

Assignment 8

TYPE OF QUESTION: MCQ

Number of questions: 10

Total mark: $10 \times 1 = 10$

QUESTION 1:

A function $f(x)$ is defined as $f(x) = \frac{1}{1+e^{-x}}$. The derivative of $f(x)$ with respect to x is given by $f'(x)$. Which of the following relationship is true?

- (a) $f'(x) = f(x)(1 + f(x))$
- (b) $f'(x) = f(x)(f(x) - 1)$
- (c) $f'(x) = f(x)(1 - f(x))$
- (d) $f'(x) = 1 - f(x)$

Correct Answer: c

Explanation:

$$\begin{aligned} f'(x) &= \frac{d}{dx} \left(\frac{1}{1+e^{-x}} \right) = \frac{e^{-x}}{(1+e^{-x})^2} = \frac{(1+e^{-x})-1}{(1+e^{-x})^2} \\ &= \frac{1}{(1+e^{-x})} - \frac{1}{(1+e^{-x})^2} = \frac{1}{1+e^{-x}} \left(1 - \frac{1}{1+e^{-x}} \right) \\ &= f(x)(1 - f(x)) \end{aligned}$$

QUESTION 2:

In which learning method in the following, those neurons which responds strongly to input stimuli have their weights updated

- (a) Competitive learning
- (b) Stochastic Learning
- (c) Hebbian Learning
- (d) Gradient Descent Learning

Correct Answer: a



Explanation: The detailed description is given in Week 8 lecture slide 36 – page no 14.

QUESTION 3:

Competitive learning is a form of

- (a) Supervised Learning
- (b) Unsupervised learning
- (c) Reinforced learning
- (d) Stochastic learning

Correct Answer: b

Explanation: The detailed description is given in Week 8 lecture– page no 6.

QUESTION 4:

Fuzzy – Genetic Hybrid system is a

- (a) Fuzzy logic in parallel with the Genetic algorithm
- (b) Fuzzy logic controlled Genetic algorithm
- (c) Genetic algorithm controlled Fuzzy logic
- (d) Genetic algorithm and fuzzy logic operating separately

Correct Answer: b

Explanation: The detailed description is given in Week 8 lecture slide 40 – page no 24.



QUESTION 5:

Which of the following statements is wrong about the learning techniques in Artificial Neural Networks (ANN)?

- (a) Learning is performed by modifying the weights, bias terms or other related parameters.
- (b) Learning is performed through multiple iterations/steps
- (c) Many of the learning techniques utilize the gradient decent method to optimize the trainable parameters
- (d) Learning is done by changing the number of hidden layers of the ANN architecture.

Correct Answer: d

Explanation: Learning is done by modifying the trainable parameters in small steps through multiple iterations. A set of popular learning methods uses the gradient decent method to minimize the error between true value and predicted value. The number of hidden layers is a part of ANN architecture which is not altered during learning. More explanations can be found in Week 8 Lecture 1 video material.

QUESTION 6:

As per neural network terminology, the terms 'feed-forward' and 'back propagation' usually indicate,

- (a) Forward propagation of input information from input layer to output layer and back propagation of input information from output layer to input layer.
- (b) Forward propagation of error from input layer to output layer and back propagation of error from output layer to input layer
- (c) Forward propagation of error from input layer to output layer and back propagation of input information from output layer to input layer.
- (d) Forward propagation of input information from input layer to output layer and back propagation of error from output layer to input layer.

Correct Answer: d



Explanation: In neural network, the input information is received at the input layer, and predicted output is computed in the output layer via some hidden layers. And the error between the true and predicted output is back propagated in the reverse direction for the purpose of weight updation.

QUESTION 7:

For the same size of training data as input, the fastest learning technique is

- (a) Supervised training with gradient descent error correction.
- (b) Supervised training with stochastic method.
- (c) Supervised training without error calculation.
- (d) Supervised training with Hebbian method.

Correct Answer: a

Explanation: According to error calculation, supervised training with gradient descent error correction is fastest.

QUESTION 8:

Which statement is true about the supervised learning approach?

- (a) In supervised learning, the output pattern is not provided with the input pattern.
- (b) In supervised learning, the ANN learns from the internal structure of the input data, and without any help of the output pattern/class labels.
- (c) Supervised learning follows the reward-penalty mechanism for the right or wrong predictions made by the network.
- (d) In supervised learning, an error is computed between the true and predicted output pattern, a network learns by minimizing this error.

Correct Answer: d

Explanation: In supervised learning, the output pattern is provided with the input pattern. Here, an error is computed between the true and predicted output pattern, and the network learns



by minimizing this error. Reward-penalty mechanism is associated with Reinforcement learning. More explanations can be found in Week 8 Lecture 1 video material.

QUESTION 9:

In Supervised learning, the incremental change (Δw) in any weight w is given by following equation: $\Delta w = -\eta \frac{\partial E}{\partial w}$, where η is the learning rate and E is the error. Here, the $-ve$ sign is used to signify the fact that if $\frac{\partial E}{\partial w} > 0$, then in the next iteration, the weight w needs to be-

- (a) Increased
- (b) Decreased
- (c) w should be kept unchanged
- (d) None of the above

Correct Answer: b

Explanation: The detailed description is given in Week 8 lecture slide 38 – page no 14

QUESTION 10:

A batch mode of training is generally implemented through the _____ in error calculation

- (a) Minimization of individual errors
- (b) Maximization of individual errors
- (c) Maximization of mean square error
- (d) Minimization of mean square error

Correct Answer: d

Explanation: The detailed explanation can be found in Week 8 Lecture 4 video material.

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