TYPE: MCQ

Q1. To determine whether the test statistic of ANOVA is statistically significant, it can be compared to a critical value. What two pieces of information are needed to determine the critical value? (1)

1. \*\*sample size, number of groups
2. mean, sample standard deviation
3. expected frequency, obtained frequency
4. MSTR, MSE

Q2. Which of the following are types of neural networks? (1)

1. Hopfield Network
2. Gated Recurrent Unit
3. Long / Short Term Memory
4. \*\*All of the mentioned

Q3. Neural Networks are trained in the following order (1)

1. Loss Function Calculation > Forward Propagation of Errors > Parameter Initialization > Gradient Descent (Differentiation) > Back Propagation > Parameter Update
2. \*\*Parameter Initialization > Forward Propagation > Loss Function > Differentiation > Back Propagation of Errors > Parameter Update
3. Parameter Initialization >Backward Propagation > Loss Function > Differentiation > Forward Propagation> Parameter Update
4. Parameter Initialization > Loss Function > Forward Propagation > Differentiation > Back Propagation of Errors > Parameter Re-initialization

Q4. Which of the rule assumes the following statement? (1)

“If two neighbor neurons activated and deactivated at the same time. Then the weight connecting these neurons should increase. For neurons operating in the opposite phase, the weight between them should decrease. If there is no signal correlation, the weight should not change.”

1. Delta Learning Rule
2. Perceptron Learning Rule
3. \*\*Hebbian learning rule
4. None of the above

Q5. Which of the following statements are true about back propagation algorithm? (1)

Statement 1: Backpropagation can be quite sensitive to noisy data.

Statement 2: Need to use the matrix-based approach for backpropagation instead of mini-batch.

Statement 3: The actual performance of backpropagation on a specific problem does not depend on the input data.

1. Statement 1 & statement 3 are correct.
2. \*\*Statement 1 & statement 2 are correct.
3. Statement 2 & statement 3 are correct.
4. All the statements are correct.

Q6. The Bayesian Belief Network can be used for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. (1)

1. decision making under uncertainty
2. Anomaly detection
3. Diagnostics
4. Time series prediction
5. \*\*All of the mentioned
6. None of the mentioned

Q7. Which of the following statements are true about Expectation-Maximization algorithm? (1)

Statement 1: It has slow convergence.

Statement 2: It makes convergence to the local optima only.

Statement 3: It can be used for discovering the values of latent variables.

Statement 4: Solutions to the M-steps often exist in the open form.

1. \*\*Statement 1, statement 2 and statement 3 are correct.
2. Statement 1, statement 3 and statement 4 are correct.
3. Statement 1, statement 2 and statement 4 are correct.
4. All the statements are correct.

Q8. State true or false: The standard Q-learning algorithm (using a Q table) applies only to discrete action and state spaces. (1)

1. \*\*True
2. False

Q9. Which of the following is/are application/applications of Restricted Boltzmann machine? (1)

1. Dimensionality reduction
2. Recommender systems
3. Topic modelling.
4. \*\*All of the above.

Q10. What is true about CNN? (1)

1. It classifies the images with different positions.
2. The computational cost is high.
3. CNN is not invariant to rotation and scale.
4. \*\*All of the above.

TYPE: DES

Q11. Attempt four of the following.

A.

|  |  |  |  |
| --- | --- | --- | --- |
| **WEIGHT** | **FOOD INTAKE** | **Exercising** | **DIABETIC** |
| **< 80** | **Low** | **Never** | **No** |
| **>= 80** | **Medium** | **Regularly** | **No** |
| **< 80** | **High** | **Never** | **Yes** |
| **>= 80** | **High** | **Occasionally** | **No** |
| **< 80** | **Medium** | **Never** | **No** |
| **>= 80** | **Low** | **Never** | **Yes** |
| **< 80** | **Low** | **Occasionally** | **No** |
| **>= 80** | **High** | **Never** | **Yes** |
| **< 80** | **Low** | **Regularly** | **No** |

For above data, where “Diabetic” is the target variable, what will be the root node using Information Gain if a decision tree is made? (5)

B. Find the hyperplane for the linear SVM.

Positively labeled data points {(3,1), (3, -1), (6, 1), (6, -1)}

Negatively labeled data points {(1, 0), (0, 1), (0, -1), (-1, 0)} (5)

C. Consider the given dataset, apply the Naïve-Bayes’ Algorithm and predict that if the fruit has the following properties then which type of fruit it is?

Fruit = {Yellow, Sweet, Long}

Frequency Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Fruit** | **Yellow** | **Sweet** | **Long** | **Total** |
| **Mango** | 350 | 450 | 0 | 650 |
| **Banana** | 400 | 300 | 350 | 400 |
| **Other** | 50 | 100 | 50 | 150 |
| **Total** | 800 | 850 | 400 | 1200 |

(5)

D. Write in brief about Deep Belief Network. (5)

E. Write in brief about perceptron algorithm. (5)