17774

BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – M.Tech.(RA)-2024
Course Name – Machine Learning in Robotics
Course Code - MEC20202A
(Semester II)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) The most widely used metrics and tools to assess a classification model is considered as:
   a) Confusion matrix b) Cost-sensitive accuracy
   c) Area under the ROC curve d) All of these

(ii) **Predict** the impact of an imbalanced dataset on model evaluation.
   a) Accuracy, Precision, Recall, F1-Score, ROC-AUC b) Mean Squared Error, R-Squared, Adjusted R-Squared
   c) PageRank, TF-IDF, BLEU Score d) Latency, Throughput, Response Time

(iii) What is the primary objective of supervised learning?
   a) To minimize the error between predicted and actual outputs b) To identify patterns in data
   c) To explore and visualize data d) To make decisions based on data

(iv) What is the primary objective of unsupervised learning?
   a) To minimize the error between predicted and actual outputs b) To identify patterns in data
   c) To explore and visualize data d) To make decisions based on data

(v) Which of the following is not a commonly used algorithm for supervised learning?
   a) Decision trees b) Naive Bayes
   c) k-means clustering d) Support vector machines

(vi) Select the primary goal of constrained optimization.
   a) Maximize the objective function b) Minimize the objective function

c) Find the largest feasible solution

d) Satisfy all constraints while optimizing the objective function

(vii) Identify which term is synonymous with the objective function in optimization?

a) Decision function

b) Cost function

c) Constraint function

d) Feasible function

(viii) Indicate which method generalizes the Lagrange multiplier method for nonlinear constrained optimization problems?

a) Gradient descent

b) Karush-Kuhn-Tucker (KKT) method

c) Newton's method

d) Conjugate gradient method

(ix) Identify which type of optimization problem involves matrix inequalities in its constraints?

a) Quadratic programming

b) Convex optimization

c) Linear programming

d) Linear matrix inequality (LMI) and Bilinear matrix inequality (BMI)

(x) Choose what is the main purpose of the perceptron learning algorithm?

a) To train recurrent neural networks

b) To train deep neural networks

c) To classify linearly separable patterns

d) To perform feature extraction

(xi) Choose In reinforcement learning, what is the role of the environment?

a) It provides feedback to the agent

b) It trains the agent's policy

c) It executes the agent's actions

d) It generates rewards for the agent

(xii) Choose which neural network architecture is specifically designed to handle sequential data?

a) Convolutional Neural Network (CNN)

b) Feedforward Neural Network (FNN)

c) Recurrent Neural Network (RNN) d) Long Short-Term Memory (LSTM)

(xiii) Estimate the data used to optimize the parameter settings of a supervised learner model.

a) Test b) Training
c) Validation d) None of these

(xiv) Select What is the main task of a problem-solving agent?

a) Solve the given problem and reach to goal b) To find out which sequence of action will get it to the goal state
c) All of these d) None of these

(xv) Select the correct definition of Probability.

a) Study of randomness and uncertainty. b) Measurement of certainty.
c) A fixed deterministic value. d) None of the above

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Determine Reinforcement Learning and predict its difference with other ML techniques. (3)
3. Explain what is 'Training set' and 'Test set'. (3)
4. Describe the Gaussian distribution and its key properties. (3)
5. Justify the use of Q-learning in reinforcement learning over other learning approaches. (3)

6. Justify how to handle Outlier Values. (3)

OR

Explain what role does the variance play in measuring a probability distribution. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Recognize the role of the confusion matrix in evaluating a learning system. State its key components. (5)

8. Describe the role of the Kalman filter in estimating the state of a dynamic system and explain how it updates the mean and variance during measurement and motion. (5)

9. Assess the significance of probability and statistics in decision-making and predictive modeling. (5)

10. Explain the principle of the gradient descent algorithm. (5)

11. Explain what are some limitations of the perceptron learning algorithm. (5)

12. Assess the importance of data preprocessing in machine learning. (5)

OR

Distinguish between supervised, unsupervised, and reinforcement learning with examples. (5)

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