BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – B.Tech.(CSE)-AIML-2022
Course Name – Pattern Recognition
Course Code - PEC-CSM601C
(Semester VI)

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) Select the example of an unsupervised learning task is
a) Linear Regression
b) Decision Tree Classification
c) Clustering.
d) Logistic Regression

(ii) In the K Means clustering, the letter K represents
a) Number of data points
b) Number of clusters
c) Hindering user experience
d) Data dimensionality

(iii) Select from the following that is a Bayesian parameter estimation method
a) MAP (Maximum A Posteriori)
b) MLE
c) PCA
d) SVM

(iv) State the objective of MLE is to
a) Maximize the likelihood function
b) Minimize the variance
c) Find the least-squares error
d) Reduce the number of parameters

(v) In K-means clustering, state the number of clusters K from the following
a) Automatically determined from the data
b) Specified by the user before training
c) Always equal to the number of data points
d) Always 1

(vi) Choose from the following option in the Gaussian distribution, the μ represents,
a) The standard deviation
b) The variance
c) The mean
d) The skewness

(vii) Choose from the following option that represent the shape of the Gaussian distribution
a) Symmetric and bell-shaped
b) Uniform
c) Skewed to the right
d) Exponential

(viii) Select from the following that is a nonparametric method for density estimation
a) Parzen-Window method
b) Maximum Likelihood Estimation
c) Expectation-Maximization
d) Bayesian Estimation

(ix) Select the option that KNN classification assigns a new point based on

a) Probability distributions
b) Majority voting among nearest points
c) Log-likelihood estimation
d) Gradient descent optimization

(x) Choose the factor significantly impacts KNN performance

a) Number of neighbors (K)
b) Learning rate
c) Prior probability
d) Transition matrix

(xi) Select the correct definition of dictionary learning in machine learning

a) A method to learn a sparse representation of data
b) A technique to store and retrieve words
c) A method to reduce computational speed
d) A method to generate new features randomly

(xii) Identify the main objective of linear discriminant functions in classification

a) Minimize intra-class variance
b) Maximize inter-class similarity
c) Maximize between-class variance
d) Minimize all variances

(xiii) State the main reason deep neural networks outperform shallow networks

a) They have more neurons
b) They learn complex features through deeper layers
c) They require fewer training samples
d) They reduce training time

(xiv) Identify the key feature of Convolutional Neural Networks (CNNs)

a) They use fully connected layers only
b) They utilize convolutional layers for feature extraction
c) They do not support image processing
d) They work only with structured data

(xv) Identify an algorithm commonly used to construct decision trees

a) AdaBoost
b) ID3
c) Linear Regression
d) Backpropagation

Group-B
(Short Answer Type Questions)
3 x 5=15

2. State the necessary conditions for two events that are to be mutually exclusive (3)
3. Compare Multilayer Perceptron (MLP) with single-layer perceptron. (3)
4. Judge your answer that Deep neural network considered as "deep"- is it true statement. (3)
5. Explain the pooling in a CNN (3)
6. Explain the concept of vanishing gradients in RNNs and its impact on training deep networks. (3)

OR

Explain recurrent neural network (RNN), and also explain it handling procedure the sequential data. (3)

Group-C
(Long Answer Type Questions)
5 x 6=30

7. Determine the optimal number of clusters in K-Means. (5)
8. Explain the different distance parameter of kNN. (5)
9. Explain the concept of margin in SVM. Compare the difference between hard and soft margin SVM. (5)
10. Compare between Convex and Non-Convex functions in Gradient Descent. (5)
11. Explain Gaussian Mixture Model (GMM) (5)
12. Compare Multilayer Perceptron (MLP) with Feedforward Neural Network (FNN). (5)

OR

Compare Deep Neural Networks (DNN) with Multilayer Perceptron (MLP). (5)

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