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Paper Code : ESC(CSBS) 502/PCCAIML 502 Machine Learning

UPID : 005937

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.

Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer *any ten* of the following : [1 x 10 = 10]

   (i) Machine learning approaches can be traditionally categorized into _____ categories.

   (ii) Feature selection tries to eliminate features which are_____.

   (iii) K -NN algorithm does more computation on test time rather than train time.[True or False]

   (iv) Which of the following helps in avoiding overfitting in decision trees?

   (v) The mean absolute difference (MAD) computes _____.

   (vi) In language understanding, the levels of knowledge that does not include?

   (vii) Where does the additional variables are added in HMM?

   (viii) Replace missing values with mean/median/mode helps to handle missing or corrupted data in a dataset. True/False?

   (ix) _____is the cleaning/transforming the data set in the supervised learning model.

   (x) In Ridge regression, as the regularization parameter increases, do the regression coefficients decrease?

   (xi) In neural networks, what is the role of nonlinear activation functions such as sigmoid, tanh, and ReLU?

   (xii) After three iterations of Hierarchical Agglomerative Clustering using Euclidean distance between points, we get the 3 clusters: C1 = {2, 4}, C2 = {7, 8} and C3 = {12, 14}. What is the distance between clusters C1 and C2 using Single Linkage and Complete Linkage?

Group-B (Short Answer Type Question)

Answer *any three* of the following : [5 x 3 = 15]

2. What is 'training Set' and 'test Set' in a Machine Learning Model? How Much Data Will You Allocate for Your Training, Validation, and Test Sets? [5]
3. What Are the Different Types of Machine Learning? [5]
4. List down the names of some popular Activation Functions used in Neural Networks. [5]
5. What are the different types of Perceptrons? what is the use of the Loss Functions? [5]
6. Why are Deep Neural Networks preferred over Shallow Neural Networks? [5]

Group-C (Long Answer Type Question)

Answer *any three* of the following : [15 x 3 = 45]

7. (a) How are covariance and correlation different from one another? [2]
   (b) State the differences between causality and correlation? [2]
   (c) We look at machine learning software almost all the time. How do we apply Machine Learning to Hardware? [2]
   (d) What is Bias, Variance and what do you mean by Bias-Variance Tradeoff? [7]
   (e) How can we relate standard deviation and variance? [2]
8. (a) While performing K-Means Clustering, how do you determine the value of K? [5]
   (b) What is the Dunn Index? [5]
   (c) What are some applications of K-means algorithm? [5]
9. (a) What is the exploding gradient problem while using the back propagation technique? [5]
   (b) Can you mention some advantages and disadvantages of decision trees? [7]
   (c) What's a Fourier transform? [3]
10. (a) How would you tune the Training Algorithm Hyperparameters to get the highest accuracy in a Neural Network? [5]

(b) What are some advantages of using Multilayer Perceptron over a Single-layer Perceptron? [5]

(c) What are some differences between SVMs and Neural Networks? [5]

11. (a) What are some Stopping Criteria for k-Means Clustering? [5]

(b) What is the main difference between k-Means and k-Nearest Neighbours? [5]

(c) Compare Hierarchical Clustering and k-Means Clustering [5]

*** END OF PAPER ***