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BSc Degree Examination November 2024

Fifth Semester

Common to all branches

22BCT52 – ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

(Regulations 2022)

Time: Three hours

Maximum: 100 marks

Answer all Questions

Part – A ($10 \times 2 = 20$ marks)

1. Compare Breadth first search & depth first search with their pros and cons. [CO1,K2]
2. Draw the structural representation of answering shopping script. [CO1,K3]
3. Outline the applications where problems cannot be solved by machine learning algorithms. [CO2,K2]
4. For the data points 5, 10,20,15,25. Find standard deviation and variance. [CO2,K3]
5. KNN is called as lazy learner. Justify this statement. [CO3,K4]
6. Inspect how post-pruning is effective than pre-pruning in decision tree. [CO3,K4]
7. Summarize any two applications of unsupervised learning algorithms. [CO4,K2]
8. For the given set of clusters [C1: 1, 3, 6, 4] and [C2: 8, 10, 11, 12]. Find sum of square error. [CO4,K3]
9. How does auto encoder differs from PCA? [CO5,K2]
10. Consider the given set of values $X=\{-4, 1, 0\}$. Apply ReLU function and find the output. [CO5,K3]

Part – B ($5 \times 16 = 80$ marks)

11. a. Assume that you are given 4- gallon jug and 3- gallon jug. Neither has any measuring marker in it. You can fill the water in it. How can you get exactly 2 - gallons of water into a 4-gallon jug? Write necessary production rules and solution steps. (16) [CO1,K3]

(OR)

- b. i) Apply breadth first search algorithm for the given tree and find the path from root node A to goal node G. (8) [CO1,K3]
- ii) Make use of simple Hill climbing algorithm for block world problem. (8) [CO1,K3]

12. a. Consider the following confusion matrix, calculate and explain the performance metrics such as accuracy, sensitivity, specificity, precision, recall, error-rate and F-measure. (16) [CO2,K2]

	Actual ; No	Actual ; Yes
Predicted : No	TN:65	FP:3
Predicted : Yes	FN:8	TP:24

(OR)

- b. i) Classify the types of data to be used in machine learning problems. Give example for each. (8) [CO2,K2]
- ii) Infer the steps and activities needed in Machine Learning with suitable diagram. (8) [CO2,K2]

13. a. Analyse the procedure to find the best splitting criteria using given spam mail (16) [CO3,K4]
data set by calculating entropy and information gain.

Contains	Domain	Has attachment	Time received	Spam
Yes	Com	Yes	Night	Yes
Yes	Edu	No	Night	Yes
No	Com	Yes	Night	Yes
No	Edu	No	Day	No
No	Com	No	Day	No
Yes	In	No	Day	Yes

(OR)

- b. Examine the different scenarios of SVM model in detail with neat sketch. Write (16) [CO3,K4]
its advantages and disadvantages.
14. a. Experiment with k-means algorithm for the given data set. Implement (16) [CO4,K3]
2-iterations and plot the data graphically. The initial cluster centroids are
(2,10)(5,8)(1,2). Write the step also.

X	2	2	8	5	7	6	1	4
Y	10	5	4	8	5	4	2	9

(OR)

- b. i) Experiment with the types of hierarchical clustering methods with neat (8) [CO4,K3]
sketch and distance formulae.
- ii) For the given data points, create two clusters by applying k-medoids (8) [CO4,K3]
algorithm with 2-iterations. The initial centroids are (21,15) (23,16)

X	19	21	20	22	30	21	36	24
Y	15	15	16	15	18	18	19	19

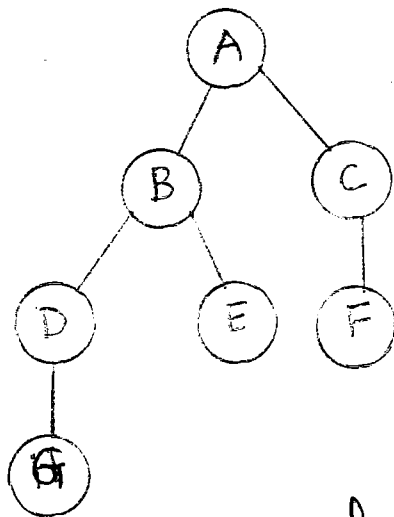
15. a. i) Explain different types of activation functions with neat sketch. (8) [CO5,K2]
- ii) Explain the forward propagation process with the given neural network (8) [CO5,K2]
and identify the output of the neuron O_3 with the learning rate 1 and target
output is 0.5.

(OR)

- b. i) Infer the working characteristics of back propagation algorithm. (8) [CO5,K2]
- ii) Illustrate the types of ensemble learning algorithms and choose which is (8) [CO5,K2]
best to study about weak learners and to combine them.

Bloom's Taxonomy Level	Remembering (K1)	Understanding (K2)	Applying (K3)	Analysing (K4)	Evaluating (K5)	Creating (K6)
Percentage	—	40	40	20	—	—

11. b. i)



Informed to students is all hall. Def.
6/10/14.

15. a. ii)

