

Register No.

BE Degree Examination May 2022

Sixth Semester

Computer Science and Engineering

18CST62 – MACHINE LEARNING

(Regulations 2018)

Time: Three hours

Maximum: 100 marks

Answer all Questions

Part – A ($10 \times 2 = 20$ marks)

1. List the various issues in machine learning. [CO1,K1]
2. Identify the three features of AI based stethoscope used by doctor. [CO1,K1]
3. Specify the role of entropy in information gain. [CO2,K1]
4. Mention the features of stochastic gradient decent. [CO2,K1]
5. Relate the concept of case based learning with other learnings. [CO3,K1]
6. State the differences between Lazy and egar learning. [CO3,K1]
7. How do you parallize the genetic algorithm? [CO4,K2]
8. Write the key properties of Kmedoids. [CO4,K1]
9. Recognise reinforcement learning from supervised learning and list the applications where it's employed. [CO5,K1]
10. Identify any two evaluation functions used in the learning rule set. [CO5,K1]

Part – B ($5 \times 16 = 80$ marks)

11. a. i) Enumerate the steps of candidate elimination algorithm. (8) [CO1,K2]
- ii) Apply find S algorithm to find maximal specific hypothesis. Draw the instance and hypothesis representation diagram. (8) [CO1,K3]

Time	Weath er	Temperat ure	Company	Humidity	Wind	Walk
Morning	Sunny	Warm	Yes	Mild	Strong	Yes
Evening	Rainy	Cold	No	Mild	Normal	No
Morning	Sunny	Moderate	Yes	Normal	Normal	Yes
Evening	Sunny	Cold	Yes	High	Strong	Yes

(OR)

- b. i) Identify the steps involved in designing a learning system. Consider a checkers learning problem as an example and show the different choices of designing it. (8) [CO1,K2]

- ii) Find the number of syntactically distinct hypothesis and semantically distinct hypothesis with the following. (8) [CO1,K3]

Outlook (sunny, rainy, overcast)

Temperature(hot, mild, cold)

Humidity (High, Normal)

Windy (True, false)

12. a. i) Write the steps of ID3 algorithm for decision tree construction. (8) [CO2,K2]

- ii) Compute information gain and identity the root node in the decision tree for the following training examples. (8) [CO1,K3]

Color	Type	Doors	Tyres	Class
Red	SUV	2	Whitewall	+
Blue	Minivan	4	Whitewall	-
Green	Car	4	Whitewall	-
Red	Minivan	4	Blackwall	-
Green	Car	2	Blackwall	+
Green	SUV	4	Blackwall	-
Blue	SUV	2	Blackwall	-
Blue	Car	2	Whitewall	+
Red	SUV	2	Blackwall	-
Blue	Car	4	Blackwall	-
Green	SUV	4	Whitewall	+
Red	Car	2	Blackwall	+
Green	SUV	2	Blackwall	-
Green	Minivan	4	Whitewall	-

(OR)

- b. i) Illustrate the concept of back propagation algorithm to train the multilayer neural network. (8) [CO2,K2]

- ii) Apply perceptron training rule for the following examples and calculate the weights associated with each input after second iteration. (8) [CO2,K3]

Initial weight are $(1, -1, 0)$, learning rate $\tau = 0.15$

X1	X2	X3	Desired O/P
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

13. a. Apply Navie Bayes classification algorithm to the given dataset and (16) [CO3,K3] construct a training / classification model.

Training Data

Color	Type	Origin	Stolen
Red	Sports	Domestic	Yes
Red	Sports	Domestic	No
Red	Sports	Domestic	Yes
Yellow	Sports	Domestic	No
Yellow	Sports	Imported	Yes
Yellow	SUV	Imported	No
Yellow	SUV	Imported	Yes
Yellow	SUV	Domestic	No
Red	SUV	Imported	No
Red	Sports	Imported	Yes

Apply the classification model to the sample given below and find the value for the class label.

Test Data

Color	Type	Origin	Stolen
Red	SUV	Domestic	?

(OR)

- b. Apply K-Nearest Neighbour learning algorithm to identify the class label (16) [CO3,K3] for the test sample given below.

Training Data

Give Birth	Car Fly	Live in water	Class
Yes	No	No	Mammals
No	No	No	Non-Mammals
No	No	Yes	Non-Mammals
Yes	No	Yes	Mammals
No	No	No	Non-Mammals
Yes	Yes	No	Mammals
No	Yes	No	Non-Mammals
Yes	No	No	Mammals
Yes	No	Yes	Non-Mammals
Yes	No	No	Mammals

Test Data:

Give Birth	Car Fly	Live in Water	Class
Yes	No	Yes	?

14. a. Apply K-means clustering algorithm to the following dataset into 3 (16) [CO4,K3] clusters. Show the cluster centroids after second iteration.

Sepal Length	Sepal Width	Class
5.1	3.5	Iris Setosa
4.9	3.0	Iris Setosa
4.7	3.2	Iris Setosa
7.0	3.2	Iris Versicolor
6.4	3.2	Iris Versicolor
6.9	3.1	Iris Versicolor
9.2	3.0	Iris Limniris
9.5	3.3	Iris Limniris
9.9	3.2	Iris Limniris

(OR)

- b. i) Consider the following two parent chromosomes (12) [CO4,K3]

Parent 1 : 111010010000

Parent 2 : 000010101011

Apply cross over operator with the cross over mark as per the following information

Types of Crossover	Crossover Mask
Single Point	111110000000
Two Point	001111100000
Uniform	100110100111

- ii) Construct the tree for the function $\tan(x) + \sqrt{y^2 + z^2}$ (4) [CO4,K3]

15. a. i) Demonstrate how the LEARN-ONE-RULE performs a general-to-specific search with an example. (8) [CO5,K2]

- ii) Elaborate the FOIL algorithm for learning first order rules. (8) [CO5,K2]

(OR)

- b. i) Highlight the features of reinforcement learning with other learnings. (8) [CO5,K2]

- ii) Elucidate the steps of Q-learning algorithm with an example. (8) [CO5,K2]

Bloom's Taxonomy Level	Remembering (K1)	Understanding (K2)	Applying (K3)	Analysing (K4)	Evaluating (K5)	Creating (K6)
Percentage	10	37	53	-	-	-