Q.6 Attempt any two:

i. Discuss at least three use cases of supervised learning in business domain. **5**

ii. How unsupervised learning can be utilized to improve the efficiency of health care applications? **5**

iii. List and describe the applications of Reinforcement learning. **5**

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Total No. of Questions: 6 *Total No. of Printed Pages:4*

Enrollment No.....

Faculty of Engineering

End Sem (Even) Examination May-2022

CS6CW07 Machine Learning

Programme: Ph.D. (Course Work) Branch/Specialisation: CSE

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. In ....., the weighted sum of inputs through an activation function is passed. Such activation function is known as sigmoid function. **1**

(a) Logistic regression (b) Linear regression

(c) Supervised learning (d) KNN algorithm

ii. Stochastic processes are widely used as mathematical models of systems and phenomena that appear to vary in a …… **1**

(a) Correlation (b) Fixed manner

(c) Random manner (d) Algorithmic way

iii. Naive Bayes classifiers uses Bayes theorem which provides a way of calculating..... **1**

(a) Output class (b) Priory probability P(A)

(c) Posterior probability P(A|B) (d) p value

iv. Support Vector Machine (SVM) is a supervised machine learning algorithm used for…… **1**

(a) Clustering (b) Regression

(c) Classification (d) Both (b) and (c)

v. The output of the unsupervised learning methods might be less accurate because- **1**

(a) Input data is not labelled, and algorithms do not know the exact output in advance.

(b) Input data is not known, and algorithms are fuzzy.

(c) Learning algorithms are not very robust.

(d) None of these

vi. .....allow market analysts to establish associations amongst data objects inside large databases. **1**
(a) Clustering (b) Association rules
(c) Trading (d) Establishment rules

vii. Which among the following applications can have a solution with Reinforcement Learning? **1**
(a) Path planning (b) Parking (c) Football (d) All of these

viii. The reinforcement learning algorithms on self-driving cars, will be best tested in the following suitable library. **1**
(a) CARLA (b) PyTorch
(c) OpenAI Gym (d) None of these

ix. Powered by machine learning and artificial intelligence, robots are- **1**
(a) Writing news stories (b) Working in hotels
(c) Managing traffic (d) All of these

x Which of the followings are most widely used tools and metrics to assess a machine learning model? **1**
(a) Confusion matrix
(b) Cost sensitive accuracy
(c) Area under the ROC curve
(d) All of these

Q.2 i. What is the use of hypothesis in machine learning? **2**
ii. Differentiate between simple linear and multiple linear regressions. **3**
iii. Explain estimation with cross-validation with the help of suitable example. **5**
OR iv. Give a detailed introduction to the resampling methods. **5**

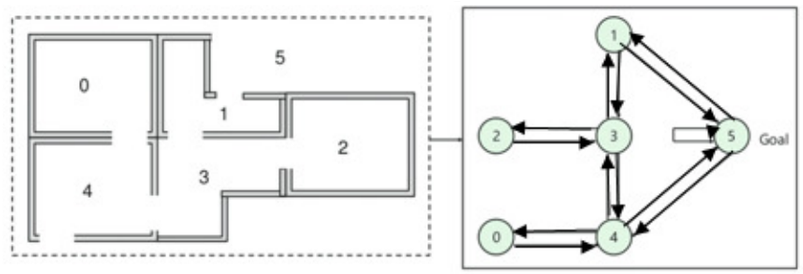
Q.3 i. Write a short note on Decision tree classifier. **2**
ii. Elucidate the working of K-NN supervised learning algorithm. Highlight the effects of increasing/decreasing the value of k? **8**
OR iii. Discuss different supervised learning methods by focusing on their advantages and disadvantages. **8**

Q.4 i. Write the advantages and disadvantages of K-means clustering. **3**
ii. Illustrate the functioning of Un-supervised machine learning algorithms with the help of appropriate example. **7**

OR iii. Cluster the following eight points (with (x, y) representing locations) into three clusters: **7**
A1(2, 10), A2(2, 5), A3(8, 4), A4(5, 8), A5(7, 5), A6(6, 4), A7(1, 2), A8(4, 9)
Initial cluster centers are A1(2, 10), A4(5, 8) and A7(1, 2).
The distance function between two points a = (x1, y1) and b = (x2, y2) is defined as-
P (a, b) = |x2 – x1| + |y2 – y1|
Apply K-Means Algorithm to find the three cluster centers after the second iteration.

Q.5 i. Differentiate Reinforcement learning with Supervised learning. Also list various Reinforcement Learning Algorithms. **4**

ii. In the given image, you can view that room represents a state Agent's movement from one room to another represents an action. **6**



Consider the situation; there are five rooms in a building which are connected by doors. Each room is numbered 0 to 4. The outside of the building can be one big outside area (5). Doors number 1 and 4 lead into the building from room 5.
The scoring/reward system is as below:
(a) Doors which lead directly to the goal have a reward of 100.
(b) Doors which is not directly connected to the target room gives zero reward.
(c) As doors are two-way, and two arrows are assigned for each room
(d) Every arrow in the above image contains an instant reward value
How do you train the agent to reach the end goal with the shortest path and maximized reward using Q-learning algorithm?

OR iii. Explain the working of reinforcement learning making use of MDP model. **6**

P.T.O.

Scheme of Marking

MEDI-CAPS UNIVERSITY Knowledge is Power	Faculty of Engineering End Sem (Even) Examination May-2022 CS6CW07 Machine Learning
Programme: Ph.D. (Course Work).	Branch/Specialisation:

Note: The Paper Setter should provide the answer wise splitting of the marks in the scheme below.

Q.1	i)	a	1
	ii)	c	1
	iii)	c	1
	iv)	d	1
	v)	a	1
	vi)	b	1
	vii)	d	1
	viii)	a	1
	ix)	d	1
	x)	d	1
Q.2	i.	The hypothesis is one of the commonly used concepts of statistics in Machine Learning. It is specifically used in Supervised Machine learning, where an ML model learns a function that best maps the input to corresponding outputs with the help of an available dataset. [2]	
	ii.	[1] mark for each difference	
	iii.	[4] marks for explanation and 1 mark for example.	
OR	iv.	[5] marks if adequate matter is written, otherwise on prorata.	
Q.3	i.	The decision tree classifier creates the classification model by building a decision tree. Each node in the tree specifies a test on an attribute, each branch descending from that node corresponds to one of the possible values for that attribute. [2]	
	ii.	working of K-NN supervised learning algorithm [6] Effect of increasing and decreasing K [2]	
OR	iii.	[2] marks for each supervised learning methods, at least 4 techniques should be written.	
Q.4	i.	[1] mark for each advantage and disadvantage	
	ii.	[5] marks for working and [2] marks if discussed any example.	
OR	iii.	[7] marks for correctly determining the three cluster centers after the second iteration, otherwise on prorata basis.	
Q.5	i.	[3] marks for the differentiation and [1] mark for listing various Reinforcement Learning Algorithms.	
	ii.	[6] marks for correctly finding the shortest path through process. Step marking may be done according to the steps correctly written.	
OR	iii.	[5] Marks for explanation as per the question. [3] marks may be awarded if MDP model has not taken.	
Q.6			
	i.	[5] marks for 3 and more use cases. [3] Marks if only two usecases is written.	
	ii.	[5] Marks if application of unsupervised learning is adequately discussed. Otherwise on prorata basis.	
	iii.	[1] mark for each application of reinforcement learning, max [5].	

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