

DEPARTMENT OF MECHATRONICS ENGINEERING VII SEMESTER B. TECH MECHATRONICS ENGINEERING <u>END SEMESTER EXAM</u>

Subject: Machine Learning Time: 2:00 to 5:00 PM Subject Code: MTE 4073 Date: 17/11/2022

Important Note: Important Note: Make necessary assumption, if required

S. No.	Question								Μ	CO	PO	LO	BL
1A	Explain multiple linear regression with explaining the criteria for								5	CO2	2,5	2,3	5
	choosing regression line. How to learn parameters for 2-d problem in												
	regression.												
1 B	Define the term machine learning, explain the supervised and								3	CO1	1,2	1,2	5
	unsupervised machine learning with example.												
1C	Compare between traditional computing and artificial neural network.								2	CO4	3,4	3,4	4
2A	For Naïve Bayes Classifier							5	CO3	3,5	3,6	5	
	(i) Estimate conditional probabilities of each attribute {color, legs,												
	height, smelly} for the species classes: {M, H} using the data given												
	in the Table 4a.												
	(ii) using these probabilities estimate the probability values for the new												
	instance-(color=green, legs=2, height=tall, and smelly=no)												
	Table 4a												
		S. No.	Color	Legs	Height	Smelly	Species						
		1	White	3	Short	Yes	М						
		2	Green	2	Tall	No	М						
		3	Green	3	Short	Yes	М						
		4	White	3	Short	Yes	М						
		5	Green	2	Short	No	Н						
		6	White	2	Tall	No	Н						
		7	White	2	Tall	No	Н	•					
		8	White	2	Short	Yes	Н	•					
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Define confusion matrix? Deduct the formula for accuracy using a	3	CO2	2,3	2,3	5
confusion matrix.					
List any four major advantages of neural network.	2	CO4	2,3	2,3	4
Elaborate the incremental approach to evolutionary robotics for demining	4	CO4	4,5	3,4	6
and underwater exploration.					
Explain the cost function; how can it be minimised?	3	CO2	2,3	2,5	5
Explain following with the help of examples	3	CO2	1,2	1,2	5
(i) Semi Supervised learning					
(ii) Reinforcement learning					
Explain in detail for decision tree	4	CO2	2,3	2,5	5
(i) Entropy					
(ii) Information gain					
(iii) Prepruning					
(iv) Postpruning					
Explain and compare the basic components of a human biological neuron	3	CO4	2,3	1,4	5
and artificial neuron with the help of neat sketch.					
Explain single layer feedforward neural network and multilayer neural	3	CO4	1,2	1,2	5
network architecture with neat sketch.					
Propose and elaborate the application of K-Nearest Neighbour (KNN)	4	CO4	3,5	3,6	6
algorithm for human action recognition.					
Determine the support vectors and estimate the hyperplane using Linear	4	CO3	2,3	3,6	5
SVM for positively and negatively labelled data points					
$\left\{ \begin{pmatrix} 3\\1 \end{pmatrix}, \begin{pmatrix} 3\\-1 \end{pmatrix}, \begin{pmatrix} 6\\1 \end{pmatrix}, \begin{pmatrix} 6\\-1 \end{pmatrix} \right\}$ and $\left\{ \begin{pmatrix} 1\\0 \end{pmatrix}, \begin{pmatrix} 0\\1 \end{pmatrix}, \begin{pmatrix} 0\\-1 \end{pmatrix}, \begin{pmatrix} -1\\0 \end{pmatrix} \right\}$ respectively.					
Formulate following activation functions used in artificial neural networks	2	CO4	2	2,3	6
(i) Bipolar sigmoid					
(ii) Hyperbolic tangent					
	Define confusion matrix? Deduct the formula for accuracy using a confusion matrix.List any four major advantages of neural network.Elaborate the incremental approach to evolutionary robotics for demining and underwater exploration.Explain the cost function; how can it be minimised?Explain following with the help of examples (i) Semi Supervised learning (ii) Reinforcement learning(ii) Entropy (iii) Information gain (iii) Prepruning (iv) PostpruningExplain and compare the basic components of a human biological neuron and artificial neuron with the help of neat sketch.Explain single layer feedforward neural network and multilayer neural network architecture with neat sketch.Propose and elaborate the application of K-Nearest Neighbour (KNN) algorithm for human action recognition.Determine the support vectors and estimate the hyperplane using Linear SVM for positively and negatively labelled data points $\{\binom{3}{1}, \binom{3}{-1}, \binom{6}{1}\}$ and $\{\binom{1}{0}, \binom{0}{-1}, \binom{-1}{-1}\}$ respectively.Formulate following activation functions used in artificial neural networks (i) Bipolar sigmoid (ii) Hyperbolic tangent	Define confusion matrix? Deduct the formula for accuracy using a confusion matrix.3List any four major advantages of neural network.2Elaborate the incremental approach to evolutionary robotics for demining and underwater exploration.4Explain the cost function; how can it be minimised?3Explain following with the help of examples (i) Semi Supervised learning (ii) Reinforcement learning3Explain in detail for decision tree (i) Entropy (ii) Information gain (iii) Prepruning (iv) Postpruning4Explain and compare the basic components of a human biological neuron and artificial neuron with the help of neat sketch.3Explain single layer feedforward neural network and multilayer neural network architecture with neat sketch.3Propose and elaborate the application of K-Nearest Neighbour (KNN) algorithm for human action recognition.4Determine the support vectors and estimate the hyperplane using Linear $\{{}^a_1, {}^a_{-1}, {}^6_{-1}\}$ and $\{{}^b_{-1}, {}^o_{-1}, {}^{-1}_{-1}\}$ and $\{{}^b_{-1}, {}^o_{-1}, {}^{-1}_{-1}\}$ respectively.4Formulate following activation functions used in artificial neural networks (i) Bipolar sigmoid (ii) Hyperbolic tangent2	Define confusion matrix? Deduct the formula for accuracy using a confusion matrix.3CO2List any four major advantages of neural network.2CO4Elaborate the incremental approach to evolutionary robotics for demining and underwater exploration.4CO4Explain the cost function; how can it be minimised?3CO2Explain following with the help of examples (i) Semi Supervised learning (ii) Reinforcement learning3CO2(i) Entropy (ii) Information gain (iii) Prepruning (iv) Postpruning4CO4Explain and compare the basic components of a human biological neuron and artificial neuron with the help of neat sketch.3CO4Explain for human action recognition.4CO4CO4Explain and compare the basic components of a human biological neuron and artificial neuron with the help of neat sketch.3CO4Explain single layer feedforward neural network and multilayer neural network architecture with neat sketch.4CO4Propose and elaborate the application of K-Nearest Neighbour (KNN) algorithm for human action recognition.4CO3Othermine the support vectors and estimate the hyperplane using Linear (i) Bipolar sigmoid (ii) Hyperbolic tangent2CO4	Define confusion matrix? Deduct the formula for accuracy using a confusion matrix.3CO22.3List any four major advantages of neural network.2CO42.3Elaborate the incremental approach to evolutionary robotics for demining and underwater exploration.4CO44.5Explain the cost function; how can it be minimised?3CO22.3Explain following with the help of examples (i)3CO21.2(i)Semi Supervised learning (ii)3CO22.3Explain in detail for decision tree (i)4CO22.3(ii)Entropy (iii)Information gain (iii)4CO22.3(iii)Prepruning (iv)Postpruning3CO42.3(iii)Prepruning (iv)Postpruning3CO42.3Explain and compare the basic components of a human biological neuron and artificial neuron with the help of neat sketch.3CO42.3Explain single layer feedforward neural network and multilayer neural network architecture with neat sketch.3CO43.5Propose and elaborate the application of K-Nearest Neighbour (KNN) algorithm for human action recognition.4CO32.3Determine the support vectors and estimate the hyperplane using Linear (i)4CO32.3SVM for positively and negatively labelled data points $\{{3, 1, (-1, 1, (-1), (-$	Define confusion matrix? Deduct the formula for accuracy using a confusion matrix.3CO22.32.32.3List any four major advantages of neural network.2CO42.32.3Elaborate the incremental approach to evolutionary robotics for demining and underwater exploration.4CO44.53.4Explain the cost function; how can it be minimised?3CO22.32.5Explain following with the help of examples (i) Semi Supervised learning (ii) Reinforcement learning3CO21.21.2(i) Semi Supervised learning (iii) Information gain (iii) Prepruning (iv) Postpruning4CO22.32.5Explain and compare the basic components of a human biological neuron and artificial neuron with the help of neat sketch.3CO42.31.4Explain single layer feedforward neural network and multilayer neural algorithm for human action recognition.3CO42.31.21.2Propose and elaborate the application of K-Nearest Neighbour (KNN) $\{{}^{(1)}_{(1)}, {}^{(1)}_{(-1)}, {}^{(1)}_{(-1)}, {}^{(-1)}_{(-1)} \}$ respectively.4CO32.33.6VM for positively and negatively labelled data points $\{{}^{(1)}_{(1)}, {}^{(1)}_{(-1)}, {}^{(1)}_{(-1)}, {}^{(-1)}_{(-1)} \}$ respectively.2CO422.3Formulate following activation functions used in artificial neural networks (i)2CO422.33.6