



DEPARTMENT OF COMPUTER SCIENCE ENGINEERING (DATA SCIENCE)

UNIT TEST - II

Class: TEDS

Semester: VI

Subject: CSC604-Machine Learning

Date: 16-04-24

Time: 2.00pm to 3:30pm

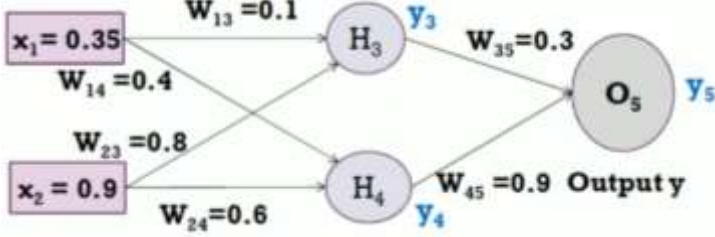
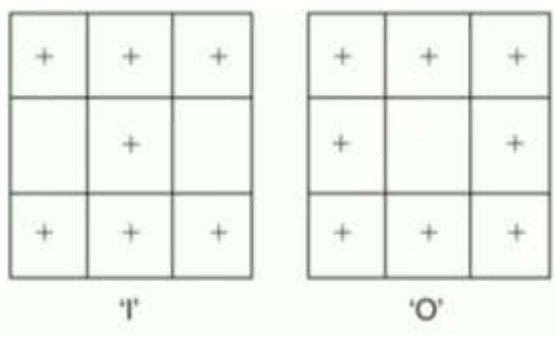

Max marks: 40

Note the following instructions

1. Attempt all questions.
2. Draw neat diagrams wherever necessary.
3. Write everything in ink (no pencil) only.
4. Assume data, if missing, with justification.

Q1	Attempt any two	Mark s	CO	Bloom's level	PO's																				
A)	Identify covariance matrix for the given data in Table, for reducing the dimension from 2 to 1 using the Principle Component Analysis(PCA) algorithm. <table><tr><td>Feature</td><td>Example 1</td><td>Example 2</td><td>Example 3</td><td>Example 4</td></tr><tr><td>X₁</td><td>4</td><td>8</td><td>13</td><td>7</td></tr><tr><td>X₂</td><td>11</td><td>4</td><td>5</td><td>14</td></tr></table>	Feature	Example 1	Example 2	Example 3	Example 4	X ₁	4	8	13	7	X ₂	11	4	5	14	[5]	CO6	L3	PO1, PO12					
Feature	Example 1	Example 2	Example 3	Example 4																					
X ₁	4	8	13	7																					
X ₂	11	4	5	14																					
B)	Make use of Principle Component Analysis (PCA) and compute eigenvector for the above Table (Que.1 A).	[5]	CO6	L3	PO1, PO12																				
C	Apply Principle component analysis (PCA) to compute first principle component for the table in Que. 1 (A)	[5]	CO6	L3	PO1, PO12																				
D	Make use of Chi-Square Analysis and find out expected values for the given data: <table><tr><td></td><td>Republican</td><td>Democrat</td><td>Independent</td><td>Total</td></tr><tr><td>Male</td><td>100</td><td>70</td><td>30</td><td>200</td></tr><tr><td>Female</td><td>140</td><td>60</td><td>20</td><td>220</td></tr><tr><td>Total</td><td>240</td><td>130</td><td>50</td><td>440</td></tr></table>		Republican	Democrat	Independent	Total	Male	100	70	30	200	Female	140	60	20	220	Total	240	130	50	440	[5]	CO6	L3	PO1, PO12
	Republican	Democrat	Independent	Total																					
Male	100	70	30	200																					
Female	140	60	20	220																					
Total	240	130	50	440																					
Q2	Attempt any two																								
A)	Apply McCulloch-Pitts Neuron to implement AND function. <table><tr><td>x₁</td><td>x₂</td><td>y</td></tr><tr><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td></tr></table>	x ₁	x ₂	y	0	0	0	0	1	1	1	0	1	1	1	0	[10]	CO5	L3	PO1, PO12					
x ₁	x ₂	y																							
0	0	0																							
0	1	1																							
1	0	1																							
1	1	0																							



B)	<p>Make a use of perceptron network to find the weights required to perform the following classification for the vectors (1,1,1,1) and (-1, 1, -1, -1) are belonging to the class 1 , vectors(1, 1, 1, -1) and (1, -1, -1, 1) are belonging to the class -1. Assume learning rate as 1 and initial weights as 0.</p>	[10]	CO5	L3	PO1, PO12
C)	<p>Apply Back Propagation algorithm to minimize the error by performing another forward pass for the following:</p>  <p>Assume that the neurons have a sigmoid activation function, perform a forward pass and a backward pass on the network. Assume that the actual output of y is 0.5 and learning rate is 1.</p>	[10]	CO5	L3	PO1, PO12
Q3	Attempt any one				
A)	<p>Apply Hebb Rule, and find weights required to perform the following classification of given input pattern '+' symbol represents the value 1 and empty equals indicate -1. Consider 'I' belongs to the members of class (so has a target value 1) and 'O' does not belong to the members of class(so has target value -1)</p> 	[10]	CO4	L3	PO1, PO12
B)	<p>Make a use of Expectation -Maximization algorithm for clustering and find the value for θ_1 and θ_2. Consider no of tosses as follows: Assume that we have two coins, C1 and C2 and bias θ_1 and θ_2 respectively.</p> 	[10]	CO4	L3	PO1, PO12



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