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Week 1: Assignment 1

Your last recorded submission was on 2023-08-04, 09:56 IST **Due date: 2023-08-09, 23:59 IST.**

1) The table below shows the temperature and humidity data for two cities. Is the data linearly separable? ***1 point***

City	Temperature (°C)	Humidity (%)
A	25	50
A	20	60
A	30	40
D	-28	45

- (●) Yes
- ( ) No
- ( ) Cannot be determined from the given information

2) What is the perceptron algorithm used for? ***1 point***

- ○ Clustering data points
- ○ Finding the shortest path in a graph
- ◉ Classifying data
- ○ Solving optimization problems

3) What is the most common activation function used in perceptrons? ***1 point***

- ○ Sigmoid
- ○ ReLU
- ○ Tanh
- ◉ Step

4) Which of the following Boolean functions cannot be implemented by a perceptron? ***1 point***

- ○ AND
- ○ OR
- ◉ XOR
- ○ NOT

5) We are given 4 points in $\mathbf{R2}$ say, $x1 = (0, 1), x2 = (-1, -1), x3 = (2, 3), x4 = (4, -5)$.Labels of $x1, x2, x3, x4$ are given to be $-1, 1, -1, 1$ We initiate the perceptron algorithm with an initial weight $w_0 = (0, 0)$ on this data. What will be the value of w_0 after the algorithm converges? (Take points in sequential order from $x1$ to x)(update happens when the value of weight changes) ***1 point***

- ○ $(0, 0)$
- ○ $(-2, -2)$
- ◉ $(-2, -3)$
- ○ $(1, 1)$

6) We are given the following data: ***1 point***

$x1$	$x2$	$y3$
2	4	1
3	-1	-1
5	6	-1
2	0	1
-1	0	1
-2	-2	1

Can you classify every label correctly by training a perceptron algorithm? (assume bias to be 0 while training)

- (●) Yes
- ( ) No

7) Suppose we have a boolean function that takes 5 inputs $x1, x2, x3, x4, x5$? We have an MP neuron with parameter $\theta = 1$. For how many inputs will this MP neuron give output $y = 1$? ***1 point***

- ( ) 21
- (●) 31
- ( ) 30
- ( ) 32

8) Which of the following best represents the meaning of term "Artificial Intelligence"? ***1 point***

- (●) The ability of a machine to perform tasks that normally require human intelligence
- ( ) The ability of a machine to perform simple, repetitive tasks
- ( ) The ability of a machine to follow a set of pre-defined rules
- ( ) The ability of a machine to communicate with other machines

9) Which of the following statements is true about error surfaces in deep learning? ***1 point***

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- ○ They are always convex functions.
- ◉ They can have multiple local minima.
- ○ They are never continuous.
- ○ They are always linear functions.

10) What is the output of the following MP neuron for the AND Boolean function? ***1 point***

$$y = \begin{cases} 1, & \text{if } x_1 + x_2 + x_3 \geq 1 \\ 0, & \text{otherwise} \end{cases}$$

- ☑ $y = 1$ for $(x_1, x_2, x_3) = (0, 1, 1)$
- ☐ $y = 0$ for $(x_1, x_2, x_3) = (0, 0, 1)$
- ☑ $y = 1$ for $(x_1, x_2, x_3) = (1, 1, 1)$
- ☐ $y = 0$ for $(x_1, x_2, x_3) = (1, 0, 0)$

You may submit any number of times before the due date. The final submission will be considered for grading.

Submit Answers