June 7, 2024   10:30 am - 01:30 pm   1T00162 - M.C.A. (SEM-II) (Choice Based) (Two Year Course)
(R-2020-21) / 70652 - Artificial Intelligence & Machin Learning   QP CODE: 10055954

(3 Hours)   **Total Marks: 80**

N.B. : 1) Question No.1 is **compulsory.**
    2) Attempt any **THREE** from the remaining questions.
    3) Figures to the right indicate full marks.

Q1. (a) What is Soft Margin Hyperplane? **[5]**

(b) What is machine learning, and how does it differ from traditional programming? **[5]**

(c) Write a note on Random Forest classifier **[5]**

(d) What is gradient descent and how does it work? **[5]**

Q2. (a) Describe the key principles behind ensemble learning. Differentiate between bagging and boosting techniques. **[10]**

(b) Discuss simple and model-based reflex agents with suitable diagram. **[10]**

Q3. (a) Find the weights using perceptron network for ANDNOT function (1 epoch). Use bipolar inputs and targets. The truth table of ANDNOT function is given below. Given, $\alpha = 1$, $\theta = 0$ and **[10]**

$$y = f(y_{in}) = \begin{cases} 1 & \text{if } y_{in} > 0 \\ 0 & \text{if } -0 \leq y_{in} \leq 0 \\ -1 & \text{if } y_{in} < -0 \end{cases}$$

x_1	x_2	t
1	1	-1
1	-1	1
-1	1	-1
-1	-1	-1

(b) Discuss Alpha-Beta search algorithm with a suitable example. **[10]**

Q4. (a) Compare Feature Extraction and Feature Selection techniques. Explain how dimensionality can be reduced using Principal Components Analysis. **[10]**

(b) Explain AO* Algorithm with an example **[10]**

Q5. (a) Discuss in detail Grouping unlabeled items using k-means clustering with the help of a suitable example **[10]**

(b) Discuss in detail Support Vector Machine (SVM) classifiers. How do they differ from traditional classification algorithms? **[10]**

Q6. (a) Explain Decision Tree classifier. How does information gain help in determining the best attribute to split on? **[10]**

(b) What is Propositional logic and First order logic in AI? Discuss with suitable examples. **[10]**

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