CYBER SECURITY SEMESTER-I ARTIFICIAL INTELLIGENCE ASSIGNMENT

Instructions:

i. All the questions are compulsory
ii. The submission should be hand-written
iii. Time of submission: 2nd November at the start of AI class. **No late submission is allowed**

1. Illustrate with an example the difference between Machine Learning, Deep Learning and Artificial Intelligence.
2. Explain what is overfitting and underfitting. Explain the techniques to avoid overfitting and underfitting.
3. Explain the terms bias and variance with respect to machine learning. Discuss the bias-variance trade-off in machine learning.
4. Discuss in detail the application of linear regression for prediction.
5. Briefly describe any two techniques used to compute the parameters of the linear regression model
6. Write a python program that does/has the following:
    a. Takes string inputs from the user and store in a list
    b. A user defined function that takes the list in *step a* as an input parameter and returns the count of strings of length greater than 5 that starts and ends with same character.

    Example: Input [“121”, “155322”, “abcbba”, “abcda”, “1a1a21”]

    Output: 2
7. Write a python program that does/has the following:
    a. Takes key value inputs from the user and store in a dictionary. The value is a list of numbers
    b. A user defined function that takes the dictionary in *step a* as an input parameter and returns the key that has minimum number of unique elements in its list.

    Example: Input [“A”:[1,2,3,1,2,5], “B”:[1,2,2,1,2,1] , “C”: [1,2,4,1,2,5] ,“D: [1, 2, 2]]

    Output: A

    D
8. A box contains 3 blue marbles, 4 red, 6 green marbles and 2 yellow marbles. If three marbles are picked at random, what is the probability that they are all blue?
9. A Bag contains 6 Blue Balls and 4 Red Balls. 3 balls are picked at random. What is the probability that none of them is Red?

10. The probability that A speaks truth is 3/5 and that of B speaking truth is 4/7. What is the probability that they agree in stating the same fact?
11. A decision making system has two algorithms algorithm-I and II. Algorithm-I produces 60% of predictions and algorithm -II produces 40% of the predictions of the total output. Further 2% of the predictions produced by algorithm-I are incorrect whereas 4% produced by algorithm -II are incorrect. If a prediction is drawn at random what is the probability that it is incorrect?
12. Explain in detail any five applications of machine learning
13. Differentiate between Pearson's correlation and Spearman's correlation. Give examples illustrating the use of both the measures.
14. Explain in brief any five supervised learning models
15. What is Naïve in Naïve Bayes supervised learning model?
16. Explain the terms loss function and cost function. Differentiate between both.
17. Differentiate between parametric model and non-parametric model.
18. Define the cost function for logistic regression model.
19. With respect to gradient descent define the following terms
    a. Stochastic gradient descent
    b. Batch gradient descent
    c. Mini batch gradient descent
20. What is regularization? Explain any two regularization techniques.