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CMTE/D-24 **24057**

MACHINE LEARNING USING PYTHON

Paper–MT–CSE–20–13(i)

Time Allowed : 3 Hours] [Maximum Marks : 75

Note : Attempt **five** questions in all, selecting **one** question from each Unit. Question No. **1** is compulsory. All questions carry equal marks.

Compulsory Question

1. (a) What is the difference between tuple and list?

   (b) Explain the concept of masking in NumPy.

   (c) How do you handle outliers in a pandas DataFrame?

   (d) Define the terms "Spread" and "Width" in the context of Radial Basis Functions.

UNIT–I

2. (a) What is filter function? Provide an example where using the filter function is more appropriate than a list comprehension ?

   (b) Explain the concept of list comprehension in Python. Write a one-liner using list comprehension to create a list of squares.

3. (a) What is an Exception? Write a Python program that asks the user to input two numbers and divides them. Handle the ZeroDivisionError and ValueError exceptions, providing appropriate error messages.

   (b) Explain the differences between the modes 'r', 'w', and 'a' when opening a file. What is the purpose of the 'b' mode (e.g., 'rb', 'wb') when working with files? Discuss.

UNIT–II

4. (a) What is k-Nearest Neighbors (k-NN) and how does it work in machine learning? Explain the role of the "k" parameter in k-NN. How do you choose an appropriate value for "k"? How do you handle categorical features in a k-NN algorithm in scikit-learn?

   (b) How do you create a NumPy array with a specified shape and data type? Explain the difference between a Python list and a NumPy array.

5. (a) What is dimensionality reduction, and how can it be performed in scikit-learn?

   (b) What is a DataFrame, and how is it different from a Series in pandas? How can you create a DataFrame in pandas from a Python dictionary?

UNIT–III

6. (a) What is Inductive bias? Explain the role of inductive bias in guiding a Machine learning model to generalize from training data to unseen data.

   (b) How does the Quality of Data impact the performance of Machine learning models? Discuss the importance of pre-processing steps in Data preparation for machine learning.

7. (a) What is Candidate elimination algorithm? What are its limitations? Discuss.

   (b) Describe the process of Training a Machine learning model. What role does the loss function play during the training of a model?

UNIT–IV

8. (a) Define what is considered a "Mistake" in the context of the Mistake Bound Model ? How does the Mistake Bound Model influence the design of learning algorithms? Discuss.

   (b) What is a Radial Basis Function (RBF) Network? How does an RBF network differ from other types of neural networks? Discuss.

9. (a) Explain the EM algorithm. What are common convergence criteria used in the EM algorithm? Discuss.

   (b) How are cases typically represented in Case-Based Learning? Provide examples of features or attributes that might be included in a case representation.