Birla Institute of Technology and Science, Pilani, Hyderabad Campus

MACHINE LEARNING FOR ELECTRONICS ENGINEERS LAB

Experiment 2

Array operations, conditional, and loop statements

For problems Q1- Q3, use numpy.

Q1. Consider a 2 x 2 square matrix of your choice.

a) Find the eigenvalues for that matrix

b) Find the corresponding eigenvectors

Verify the answers with your hand calculation

Q2. Consider a matrix X = $\begin{bmatrix} 10 & 12 & 13 \\ 3 & 2 & 5 \\ 8 & 4 & 7 \end{bmatrix}$

a) Find the transpose of the matrix X

b) Find the determinant of the matrix X

c) Find the inverse of the matrix X

d) Replace the element at the location (1,2) with 11

Q3. Consider a 4 × 3 matrix of your choice. Reshape that matrix into the following dimensions

a) 3 × 4

b) 6 × 2

c) 2 × 6

d) 12 × 1 or 1 × 12

Note down your observations.

Q4. a) Create a 1D row array that starts with the value 2 and ends at 20 in steps of 2 (Hint: Use numpy's arange function).
b) Create a column or row array of your choice using the linspace function of numpy.

Conditional and Loop Statements in Python

Q5. Write a Python code using if-else statement to implement the following

a) Take an input from the user, which is the score obtained by the student in the exam. Using an if-else statement, determine the grade for that score, given the following conditions:
   - If Marks ≥ 90 then print 'A grade'
   - If marks are between 80 and 90, then print 'B grade'
   - If between 70 and 80, then print 'C grade'
   - For any score below 70, print 'failed'.

     Explore and understand the logical operators while solving this question.

b) Take any input number from the user and use if-else statements to check whether the number is odd or even. If the number is odd, check whether it is a single-digit, double-digit, or triple-digit number (output should be displayed). For an even number, check whether the input number has zero as a digit in it or not (output should be displayed).
   Note: Do not enter any number beyond 3 digits, and do not enter the value '0' or any negative number. Do not use/import any libraries and do not use loop statements. Use a nested if-else statement for this

question.

Q6. Using ‘for’ loop statements (for loop and nested for loops) write a Python code to implement the following

a) Calculate the sum of all numbers from 1 to a given number n (e.g., if n=10, the sum is 55). Display the output.

b) Given an array and a target sum, find all unique pairs of numbers from the array that add up to the target value. Display the pair of numbers

numbers = [2, 7, 11, 4, 15, 3, 8, 1]

target = 10