

Name- Sushilkumar D. Dhamane

Class- SE1

Roll No. - 21123

Sub- DGL

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Problem Statement

Write a python program to Perform the following operations

1. Addition of two matrix.
2. Subtraction of two matrix.
3. Multiplication of two matrix.
4. Transpose of two matrix.

Objective-

1. To understand the concept of matrix operation.
2. To understand the data structure used for performing these operation.

Outcomes:

1. To implement matrix operation using List data structure of python.
2. Write menu driven modular program in python.
3. Implement user defined functions.

Software Requirement:

- 1) operating system = 64 bit
- 2) Programming Language = Python.
- 3) Programming tool/IDE : pycharm.

Theory:

class- class is a userdefined data type which contains data & functions. This class helps us to encapsulate all the data in it. After the creation of class, instances objects are used to perform operation on the object.

- List- A list is a data structure in python that is a mutable / changeable, ordered sequence of elements. Just as strings are defined as characters between quotes, lists are defined by having values betⁿ square brackets. They enable you to keep data together, condense your code & perform same methods & operations on multiple values at once.
- Matrix- Matrix is a special case of 2D array where each data element is of strictly same size. Matrices are very imp data structure for many mathematical & scientific notations.

Algorithm.

1) Algorithm for Addition of two matrix.

1. Start.
2. Read the No. of Rows & Column
3. Read the element in matrix 1 and matrix 2 in which the element are taken by user.
4. if ~~both~~ No. of Rows & Column for both matrix are equal then Add the element of 1st row of matrix 1 to the 1st row of matrix 2.
5. Else Addition is not valid.
6. Repeat step 4 for each element in matrix.

2) Algorithm for subtraction of two matrix.

1. Start
2. Read the No. of rows and column
3. Read the element in matrix 1 & matrix 2 in which the element are taken by user
4. Read the Result as matrix as empty.

4. if No. of rows and column for both matrix are same then add the element of 1st row of matrix 1 to the 1st row of matrix 2.
5. else Addition is not valid.
6. Repeat step 4 for every row in the matrix.
7. Write result.

5) Algorithm for Transpose.

1. Start.
2. Read the Number of Rows and column for matrix.
3. Read the element in matrix.
4. Call the element of matrix as per the iteration.
5. store the element in reverse order in way matrix elements are called.
6. Repeat Step 4 & 5 for all the element in matrix until loops gets over.

4) Algorithm for Multiplication of two matrix.

1. Start
2. Read the No. of rows and column for matrix 1 and matrix 2.
3. Read the empty list as result matrix.
4. if No. of column of matrix 1 is equal to No. of rows of matrix 2 then for element in range of length of matrix 1 & in range of length of matrix 2.
5. After calling 1st term of each matrix, multiply and store in result, then for next term multiply both term and add it with previous result.
6. else write multiplication is not valid.
7. Repeat step 3 to 6 for all element unit for loops gets over.

Pseudocode.

1) Pseudocode for Addition.

```
1. row = int(input())  
   column = int(input())  
2. print("Enter the element for matrix 1")  
   matrix1 = [[int(input()) for j in range(column)] for i in range(row)]  
   print(matrix1)  
3. for i in range(row):  
       for j in range(column):  
           print(matrix1[i][j], end=" ")  
       print()  
4. "Enter the element for matrix 2":  
   print(matrix2)  
5. for i in range(row):  
       for j in range(column):  
           print(matrix2[i][j], end=" ")  
       print()  
6. result = [[0 for i in range(column)] for j in range(row)]  
7. for i in range(row):  
       for j in range(column):  
           result[i][j] = matrix1[i][j] + matrix2[i][j]  
       print()  
   print(result)
```

2) Pseudocode for subtraction.

```
1. row = int(input())  
   column = int(input())  
2. print("Enter the element for matrix 1")  
   matrix1 = [[int(input()) for j in range(column)] for i in range(row)]  
   print(matrix1)
```



```

3. for i in range(row):
    for j in range(column):
        print(matrix[i][j], end=" ")
    print()
4. "Enter the element for matrix2"
   print(matrix2)
5. for i in range(row):
    for j in range(column):
        print(matrix[i][j], end=" ")
    print()
6. result = [[0 for i in range(column)] for j in range(row)]
7. for i in range(row):
    for j in range(column):
        result[i][j] = matrix1[i][j] - matrix[i][j]
    print()
print(result)

```

#3. Pseudocode for Transpose

```

1. Read the no. of rows & column as p & q.
2. for i in range(p):
    for j in range(q):
        write matrix[i][j]
    print()
for .
3. Create the Result_matrix = [ ].
4. for i in range(q):
    for j in range(p):
        result[i][j] = matrix[j][i]
    print(result[i][j] → end=" ")

```

```

#Write a python Program to compute following on matrix:
print("1.Addition of two matrix")
print("2.Subtraction of two matrix")
print("3.Multiplication of two matrix")
print("4.Transpose of a Matrix")
row=int(input("enetr the number of rows:"))
coloum=int(input("enetr the number of coloum:"))
print("Enter the elements for matrix1: ")
matrix1=[[int(input())    for j in range(row)]  for i in range(coloum) ]
#list comprehension
print("matrix1 is.....")
for i in range(row):
    for j in range(coloum):
        print(matrix1[i][j],end=" ")
    print()
print("Enter the elements for matrix2: ")
matrix2 = [[int(input()) for j in range(row)] for i in range(coloum)]
print("matrix2 is.....")
for i in range(row):
    for j in range(coloum):
        print(matrix2[i][j], end=" ")
    print()
def addition():
    result = [[0 for i in range(coloum)] for j in range(row)]
    for i in range(row):
        for j in range(coloum):
            result[i][j] = matrix1[i][j] + matrix2[i][j]
        print()
    print("Addition of matrix1 & matrix2 is...")
    for i in range(row):
        for j in range(coloum):
            print(result[i][j], end=" ")
        print()
def subtraction():
    result = [[0 for i in range(coloum)] for j in range(row)]
    for i in range(row):
        for j in range(coloum):
            result[i][j] = matrix1[i][j] - matrix2[i][j]
        print()
    print("Addition of matrix1 & matrix2 is...")
    for i in range(row):
        for j in range(coloum):
            print(result[i][j], end=" ")
        print()
def multiplication():
    m = int(input("enter the number of rows in matrix1:"))
    n = int(input("enter the  number of coloum in matrix1:"))
    p = int(input("enter the number of rows in matrix2:"))
    q = int(input("enter the  number of coloum in matrix2:"))
    matrix1=[]
    if (p==n):
        for i in range(m):
            matrix1.append([])
        for i in range(m):
            for j in range(n):
                matrix1[i].append(j)

```

```

        matrix1[i][j] = 0
        print("Element in row", i + 1, "coloum", j + 1)
        matrix1[i][j] = int(input())
    print()
print()
print(matrix1)
matrix2 = []
for i in range(p):
    matrix2.append([])
for i in range(p):
    for j in range(q):
        matrix2[i].append(j)
        matrix2[i][j] = 0
        print("Element in row", i + 1, "coloum", j + 1)
        matrix2[i][j] = int(input())
    print()
print(matrix2)
result = []
for i in range(m):
    result.append([])
for i in range(m):
    for j in range(q):
        result[i].append(j)
        result[i][j] = 0
for p in range(len(matrix1)):
    for q in range(len(matrix2[0])):
        for r in range(len(matrix2)):
            result[p][q] += matrix1[p][r] * matrix2[r][q]
print("MUltiplication of both matrix is..... ")
print(result)
else:
    print("Mutiplication is Invalid!! As,Number of coloum of matrix1 is
not same as Number of rows of matrix2")

def transpose():
    p=int(input("enter the number of rows:"))
    q= int(input("enter the number of coloum:"))
    print("Enter the element for matrix:")
    matrix=[[int(input())    for i in range(q)]    for j in range(p)]
    print("Matrix is.....")
    for i in range(p):
        for j in range(q):
            print(format(matrix[i][j]),end="  ")
        print()
    result=[[0    for i in range(p)]    for j in range(q)]
    for i in range(q):
        for j in range(p):
            result[i][j]=matrix[j][i]
    print("Transpose of matrix is.....")
    for i in range(q):
        for j in range(p):
            print(format(result[i][j]),end="  ")
        print()
while(True):
    choice=int(input("Enter the choice:"))
    if (choice==1):
        addition()

```

```
elif (choice==2):
    subtraction()
elif (choice==3):
    multiplication()
elif (choice==4):
    transpose()
#elif (choice==5):
#    occurance()
else:
    break
stop = input("would you like to continue(y/n):")
if (stop == "n"):
    print("THANK YOU!!")
    break
```