**Modern Education Society’s**

**College of Engineering, Pune**

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| **NAME OF STUDENT: Prathamesh Kalyan Sable CLASS: SE Comp 1** |
| **SEMESTER/YEAR: Sem – 3 / 2022 ROLL NO: F21111015** |
| **DATE OF PERFORMANCE: 14/09/2022 DATE OF SUBMISSION: 21/09/2022** |
| **EXAMINED BY: Mrs. N.R. Mhaske EXPERIMENT NO: DSL A-09** |

###### TITLE: Perform various operations on matrices

**PROBLEM STATEMENT:**  Write a **Python** program to compute following computation on matrix:

A) Addition of two matrices B) Subtraction of two matrices

C) Multiplication of two matrices D) Transpose of a matrix

### **OBJECTIVES:**

1. To understand structure of 2DArray.
2. To understand how to Create, Display and perform various operations on 2D array.

### **OUTCOMES:**

1. To analyze the problems to apply suitable algorithm and data structure.
2. To understand concept of multi-dimensional array.

**PRE-REQUISITES:**

* 1. Knowledge of python programming
  2. Knowledge of 2D array and matrix operations.

**APPARATUS:**

Computer Machine, python3 installed, etc.

**QUESTIONS:**

1. What is sparse matrix? Explain with example.
2. Write algorithm to perform fast transpose on sparse matrix.

**SOURCE CODE:**

def display(matrix):

    for row in matrix:

        for element in row:

            print(element,end = " ")

        print()

def read(row,col):

    matrix = []

    for i in range(row):

        matrix.append([])

        for j in range(col):

            elmt = int(input(f"Enter element in row {i+1} and column {j+1}:"))

            matrix[i].append(elmt)

    return matrix

def addition(mat1,mat2):

    r1 = len(mat1)

    c1 = len(mat1[0])

    add = []

    for i in range(r1):

        add.append([])

        for j in range(c1):

            add[i].append(mat1[i][j]+mat2[i][j])

    return add

def subtraction(mat1,mat2):

    r1 = len(mat1)

    c1 = len(mat1[0])

    sub = []

    for i in range(r1):

        sub.append([])

        for j in range(c1):

            sub[i].append(mat1[i][j]-mat2[i][j])

    return sub

def multiplication(mat1,mat2):

    r1 = len(mat1)

    c1,c2 = len(mat1[0]),len(mat2[0])

    multi = []

    for i in range(r1):

        multi.append([])

        for j in range(c2):

            sum = 0

            for k in range(c1):

                sum += mat1[i][k]\*mat2[k][j]

            multi[i].append(sum)

    return multi

def transpose(matrix):

    trans = []

    row = len(matrix)

    col = len(matrix[0])

    for i in range(col):

        trans.append([])

        for j in range(row):

            elmt = matrix[j][i]

            trans[i].append(elmt)

    return trans

def main():

    while True:

        print("MENU".center(50,'-'))

        print("1. Addition of two matrices ")

        print("2. Subtraction of two matrices ")

        print("3. Multiplication of two matrices ")

        print("4. Transpose of a matrix ")

        print("5. Exit the program ")

        ch = input("Enter your choice :")

        if ch == '1':

            r1 = int(input("Enter number of rows in matrix :"))

            c1 = int(input("Enter number of columns in matrix :"))

            print("--Enter Matrix 1")

            mat1 = read(r1,c1)

            print("--Enter Matrix 2")

            mat2 = read(r1,c1)

            res = addition(mat1,mat2)

            print("Addition of Matrix ")

            display(mat1)

            print("&")

            display(mat2)

            print(" is ")

            display(res)

        elif ch == '2':

            r1 = int(input("Enter number of rows in matrix :"))

            c1 = int(input("Enter number of columns in matrix :"))

            print("--Enter Matrix 1")

            mat1 = read(r1,c1)

            print("--Enter Matrix 2")

            mat2 = read(r1,c1)

            res = subtraction(mat1,mat2)

            print("Subtraction of Matrix ")

            display(mat1)

            print("&")

            display(mat2)

            print(" is ")

            display(res)

        elif ch == '3':

            can\_multi = False

            while not can\_multi:

                r1 = int(input("Enter number of rows in matrix 1:"))

                c1 = int(input("Enter number of columns in matrix 1:"))

                r2 = int(input("Enter number of rows in matrix 2:"))

                c2 = int(input("Enter number of columns in matrix 2:"))

                if (c1!=r2):

                    print("Number of columns of Matrix 1 should be equal to Number of rows of Matrix 2 for Performing Multiplication.")

                else:

                    can\_multi = True

            print("--Enter Matrix 1")

            mat1 = read(r1,c1)

            print("--Enter Matrix 2")

            mat2 = read(r2,c2)

            res = multiplication(mat1,mat2)

            print("Multiplication of Matrix ")

            display(mat1)

            print("&")

            display(mat2)

            print(" is ")

            display(res)

        elif ch == '4':

            r1 = int(input("Enter number of rows in matrix :"))

            c1 = int(input("Enter number of columns in matrix :"))

            print("--Enter Matrix ")

            mat1 = read(r1,c1)

            res = transpose(mat1)

            print("Transpose of Matrix is ")

            display(mat1)

            print(" is ")

            display(res)

        elif ch == '5':

            print("Thank you for using Application :)")

            break

        else:

            print("Please enter a valid choice.")

main()

**OUTPUT:**







