Experiment: 1.2

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Aim of the practical:

A non-rectangular integer array (jagged array) is given. Implement the "bubble" sorting method (do not use the Array class method!) so that youcan arrange the rows of the matrix

- in ascending (descending) order of the sums of the elements of the rowsof the matrix;
- in ascending order (descending) of the maximum elements of the matrixrows;
- in ascending (descending order) of the minimum elements of the matrixrows.

Program:

```
using System;
class Program
{
    static void Main()
    {
        int[][] arr = new int[][] {
            new int[] {1, 2, 3},
            new int[] {4, 5},
            new int[] {6, 7, 8, 9},new
            int[] {10}
        };

        Console.WriteLine("Unsorted array:");
        PrintArray(arr);

        BubbleSort(arr, "sum", "ascending");
        Console.WriteLine("Sorted by sum in ascending order:");
        PrintArray(arr);
        BubbleSort(arr, "sum", "descending");
        Console.WriteLine("Sorted by sum in descending order:");
```

```
        PrintArray(arr);

        BubbleSort(arr, "max", "ascending");
        Console.WriteLine("Sorted by max in ascending order:");
        PrintArray(arr);

        BubbleSort(arr, "max", "descending");
        Console.WriteLine("Sorted by max in descending order:");
        PrintArray(arr);

        BubbleSort(arr, "min", "ascending");
        Console.WriteLine("Sorted by min in ascending order:");
        PrintArray(arr);

        BubbleSort(arr, "min", "descending");
        Console.WriteLine("Sorted by min in descending order:");
        PrintArray(arr);
    }

    static void BubbleSort(int[][] arr, string sortBy, string sortOrder)
    {
        bool   swapped;
        int n = arr.Length;

        do
        {
            swapped = false;

            for (int i = 0; i < n - 1; i++)
            {
                int result = Compare(arr[i], arr[i + 1], sortBy);

                if ((sortOrder == "ascending" && result > 0) ||
                    (sortOrder == "descending" && result < 0))
                {
                    Swap(arr, i, i + 1);
                    swapped = true;
                }
            }
```

```
            n--;
        } while (swapped);
    }

    static int Compare(int[] arr1, int[] arr2, string sortBy)
    {
        int result;

        switch (sortBy)
        {
            case "sum":
                result = Sum(arr1) - Sum(arr2);
                break;
            case "max":
                result = Max(arr1) - Max(arr2);
                break;
            case "min":
                result = Min(arr1) - Min(arr2);break;
            default:
                throw new ArgumentException("Invalid sort type");
        }

        return result;
    }

    static int Sum(int[] arr)
    {
        int sum = 0;

        for (int i = 0; i < arr.Length; i++)
        {
            sum += arr[i];
        }

        return sum;
    }

    static int Max(int[] arr)
    {
```

```
        int max = arr[0];

        for (int i = 1; i < arr.Length; i++)
        {
            if (arr[i] > max)
            {
                max = arr[i];
            }
        }

        return max;
    }

    static int Min(int[] arr)
    {
        int min = arr[0];

        for (int i = 1; i < arr.Length; i++)
        {
            if (arr[i] < min)
            {
                min = arr[i];
            }
        }

        return min;
    }

    static void Swap(int[][] arr, int i, int j)
    {
        int[] temp = arr[i];
        arr[i]  =  arr[j];
        arr[j] = temp;
    }

    static void PrintArray(int[][] arr)
    {
        for (int i = 0; i < arr.Length; i++)
        {
            Console.Write("{ ");
```

```
            for (int j = 0; j < arr[i].Length; j++)
            {
                Console.Write(arr[i][j]);
            }
            Console.Write("}");
            Console.WriteLine();
        }
    }
}
```

Output:

```
Microsoft Visual Studio Debug Console
Unsorted array:
{ 123}
{ 45}
{ 6789}
{ 10}
Sorted by sum in ascending order:
{ 123}
{ 45}
{ 10}
{ 6789}
Sorted by sum in descending order:
{ 6789}
{ 10}
{ 45}
{ 123}
Sorted by max in ascending order:
{ 123}
{ 45}
{ 6789}
{ 10}
Sorted by max in descending order:
{ 10}
{ 6789}
{ 45}
{ 123}
Sorted by min in ascending order:
{ 123}
{ 45}
{ 6789}
{ 10}
Sorted by min in descending order:
{ 10}
{ 6789}
{ 45}
{ 123}

D:\DotnetLabExperiment\ConsoleApp1\ConsoleApp1\bin\Debug\net6.0\ConsoleApp1.exe (process 11596) exited with code 0.
Press any key to close this window . . .
```