PROGRAM 14

QUESTION:

Write a program in java to enter m x n matrix and print the column maximum and minimum element of the matrix.

Class Name – columnMaxAndMinElement

Instance Variable:

* int [][] arr – Integer array to store the input of the matrix.
* int M – to store the number of rows.
* int N – to store the number of columns.

Methods:

* columnMaxAndMinElement (int mm, int nn) – to initialize M = mm, N = nn.
* void input() – to take input of the matrix.
* void column\_min\_max() – to calculate and print the minimum and maximum elements in each column of a matrix.
* void display() – to display the original matrix.

Implement main method and call all the above methods properly.

ALGORITHM:

1. Create a class called `columnMaxAndMinElement`.
2. Declare instance variables:
   * 1. `int[][] arr` to represent the 2D integer matrix.
     2. `int M` to store the number of rows in the matrix.
     3. `int N` to store the number of columns in the matrix.
3. Define a constructor `columnMaxAndMinElement(int mm, int nn)` that takes the number of rows `mm` and number of columns `nn` as parameters:
   * 1. Initialize `M` and `N` with the provided values.
     2. Create a new 2D integer array `arr` with dimensions M x N.
4. Implement the `input` method:
   * 1. Create a `Scanner` object `sc` to read input from the console.
     2. Display a prompt: "Enter the elements of Matrix."
     3. Use nested loops to input integer values for each element of the matrix and store them in the `arr` array.
5. Define a method `col\_min\_max()` to find and display the minimum and maximum values in each column of the matrix.
   * 1. Iterate over each column (j) from 0 to N-1.
     2. Initialize `max` and `min` with the value at the first row and current column (arr[0][j]).
     3. Iterate over each row (i) from 0 to M-1.
     4. If the element at arr[i][j] is greater than `max`, update `max` with the new maximum value.

* + 1. If the element at arr[i][j] is less than `min`, update `min` with the new minimum value.
    2. Print the minimum and maximum values for the current column.

1. Implement the `display` method:
   * 1. Display the message: "The original Matrix is : "
     2. Use nested loops to iterate through each row and column of the matrix and print its elements.
2. Create main Method:
   * 1. Create a `Scanner` object `sc` to read input from the console.
     2. Display prompts to the user to enter the number of rows and columns for the matrix (`r` and `c`).
     3. Create an instance of the `columnMaxAndMinElement` class with `r` and `c` as arguments.
     4. Call the `input` method to input matrix elements.
     5. Call the `display` method to display the original matrix.
     6. Call the `column\_min\_max` method to calculate and display the minimum and maximum values in each row.

8.End.

**VARIABLE DESCRIPTION TABLE**

|  |  |  |
| --- | --- | --- |
| Variable | Data Type | Description |
| Name |  |  |
| arr | int[][] | 2D integer array |
|  |  | representing the matrix. |
| M | int | Integer representing the |
|  |  | number of rows in the |
|  |  | matrix. |
| N | int | Integer representing the |
|  |  | number of columns in |
|  |  | the matrix. |
| mm | int | Integer parameter |
|  |  | passed to the |
|  |  | constructor to set the |
|  |  | number of rows. |
| nn | int | Integer parameter |
|  |  | passed to the |
|  |  | constructor to set the |
|  |  | number of columns. |
| sc | Scanner | Scanner object for |
|  |  | reading input from the |
|  |  | console. |
| r | int | Integer representing the |
|  |  | number of rows in the |
|  |  | matrix (user input). |
| c | int | Integer representing the |
|  |  | number of columns in |
|  |  | the matrix (user input). |
| obj | columnMaxAndMinElement | Instance of the |
|  |  | rowMaxAndMinElement |
|  |  | class. |