To create a matrix of size 50×50 of numbers ranging from 0 to 9.Find the length of the largest sorted component horizontally.

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Introduction

Given a 2d array with n number of rows and m number of columns where n and m is less than 50. The elements of the array will range from 0 to 9. We have to print the length of largest sorted component of the array horizontally. We will discuss diffrent algorithm for this and the complexity of algorithms.

Example:

Input	Output:
3 4 5 6	4
4 3 1 5	
3 4 5 1	

Algorithm Design

We have designed three algorithm For finding the union of two sets of positive Integers.

1. Brute-force

In this algorithm we have checked for each row if the array is increasing or decreasing we have increased the cnt variable and else we have updated the max_cnt variable and make the cnt variable 0.

2. Searching and sorting

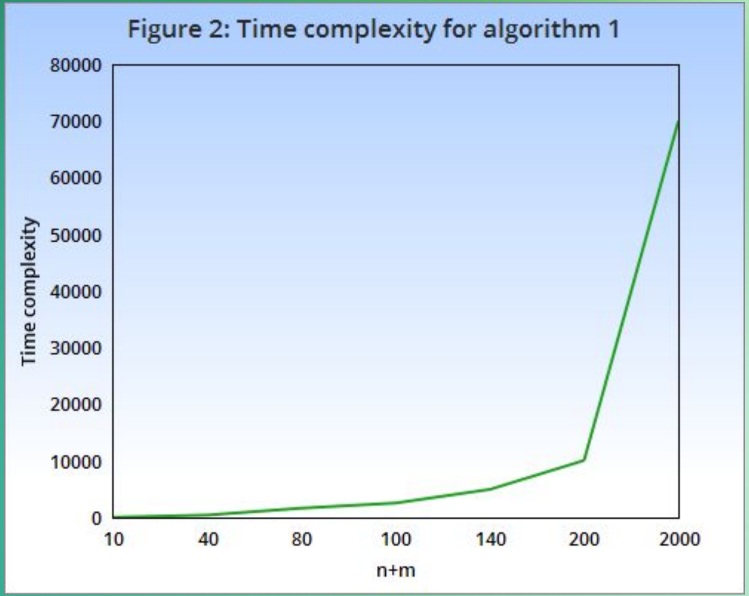
In this algorithm we are storing the length of the sorted subarrays of the array in a vector count using nested for loop . Then we are sorting it printing the largest length of the sorted subsequence.

1. Brute Force

Time Complexity

Best case : Ω(n^2)
Average case : θ(n^2)
Worst case : O(n^2)

Space Complexity : n*m



Pseudo Code for Brute force

```
int Brute(int a[][], int n, int m)
{
   int max_cnt=0,cnt=1;
      for(i =0 to  n){

for( j=1 to j=m)
         {
            if(a[i][j]>a[i][j-1])
              cnt++;
           else{
            max_cnt=max(cnt,max_cnt);
            cnt=1;}
         }
Return max_cnt;
}
```

Ex:

INPUT

```
3 4
1 2 3 4
9 8 6 5
0 6 7 1
```

OUTPUT:

```
4
```

2. Searching and Sorting

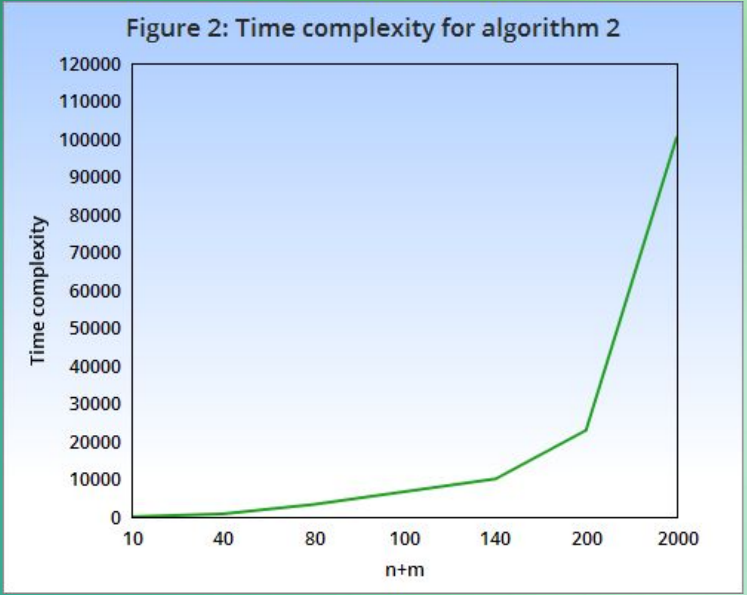
Time complexity

Best case : Ω(n^2)

Average case : θ(n^2.logn)

Worst case : O(n^2logn)

Space Complexity : O(n*m)



Pseudo code

```
int sorting_cnt(int a[][], int n, int m)
{
   int n, m;
   int max_cnt=0,cnt=1;
   vector<int>count;
   for( i=0 to i=n){
   for( j=1 to m)
   {
     if(a[i][j]>a[i][j-1]){
          cnt++;
          v.push_back(cnt);
    }
   else
          cnt=1;
   }}
   sort(count.begin(), count.end());
          Return count[count.size()-1];
}
```

EX:

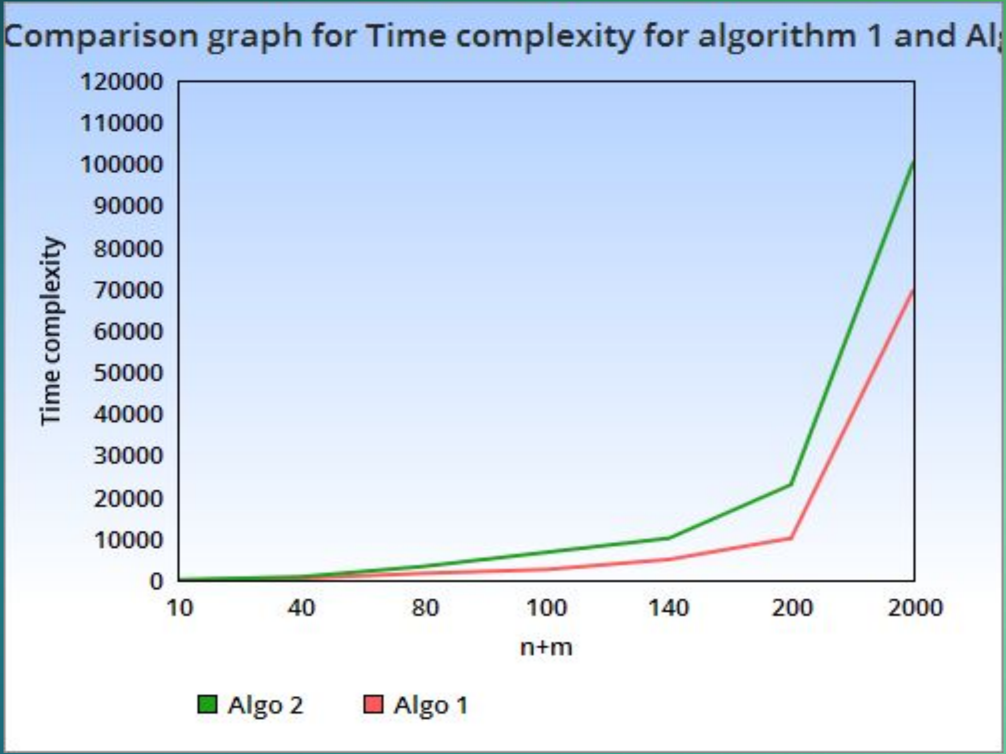
INPUT:

```
3 4
3 4 5 1
1 2 3 4
9 8 7 6
```

OUTPUT:

```
4
```

Comparison of time Complexity of two Algorithm



Conclusion

Time complexity for finding the length of the largest sorted subarray will be minimum in brute force which is O(n^2) and for sorting count algorithm time complexity will be O(n^2logn).

References:

1. https://www.quora.com/How-would-one-use-Arrays-sort-on-a-multidimensional-array-of-ints-by-the-first-element-of-each-sub-array-in-Java
2. https://www.geeksforgeeks.org/longest-increasing-path-matrix/