Dynamic Programming | Set 14 (Maximum Sum Increasing Subsequence)

Given an array of n positive integers. Write a program to find the sum of maximum sum subsequence of the given array such that the intgers in the subsequence are sorted in increasing order. For example, if input is {1, 101, 2, 3, 100, 4, 5}, then output should be 106 (1 + 2 + 3 + 100), if the input array is {3, 4, 5, 10}, then output should be 22 (3 + 4 + 5 + 10) and if the input array is {10, 5, 4, 3}, then output should be 10

Solution

This problem is a variation of standard Longest Increasing Subsequence (LIS) problem. We need a slight change in the Dynamic Programming solution of LIS problem. All we need to change is to use sum as a criteria instead of length of increasing subsequence.

Following is C implementation for Dynamic Programming solution of the problem.

```
/* Dynamic Programming implementation of Maximum Sum Increasing
   Subsequence (MSIS) problem */
#include<stdio.h>

/* maxSumIS() returns the maximum sum of increasing subsequence in arr
   size n */
int maxSumIS( int arr[], int n )
{
   int *msis, i, j, max = 0;
   msis = (int*) malloc ( sizeof( int ) * n );

   /* Initialize msis values for all indexes */
   for ( i = 0; i < n; i++ )
      msis[i] = arr[i];

   /* Compute maximum sum values in bottom up manner */
```

Google™ Custom Search

GeeksforGeeks

53,521 people like GeeksforGeeks.

Interview Experiences
Advanced Data Structures
Dynamic Programming
Greedy Algorithms
Backtracking
Pattern Searching
Divide & Conquer
Mathematical Algorithms
Recursion
Geometric Algorithms

open in browser PRO version Are you a developer? Try out the HTML to PDF API pdfcrowd.com

```
   for ( i = 1; i < n; i++ )
      for ( j = 0; j < i; j++ )
         if ( arr[i] > arr[j] && msis[i] < msis[j] + arr[i])
            msis[i] = msis[j] + arr[i];

   /* Pick maximum of all msis values */
   for ( i = 0; i < n; i++ )
      if ( max < msis[i] )
         max = msis[i];

   /* Free memory to avoid memory leak */
   free( msis );

   return max;
}

/* Driver program to test above function */
int main()
{
  int arr[] = {1, 101, 2, 3, 100, 4, 5};
  int n = sizeof(arr)/sizeof(arr[0]);
  printf("Sum of maximum sum increasing subsequence is %d\n",
         maxSumIS( arr, n ) );

  getchar();
  return 0;
}
```

Time Complexity: O(n^2)

Source: Maximum Sum Increasing Subsequence Problem

Please write comments if you find anything incorrect, or you want to share more information about the topic discussed above.

Popular Posts

All permutations of a given string
Memory Layout of C Programs
Understanding “extern” keyword in C
Median of two sorted arrays
Tree traversal without recursion and without stack!

open in browser PRO version Are you a developer? Try out the HTML to PDF API pdfcrowd.com

Structure Member Alignment, Padding and Data Packing
Intersection point of two Linked Lists
Lowest Common Ancestor in a BST.
Check if a binary tree is BST or not
Sorted Linked List to Balanced BST

open in browser PRO version Are you a developer? Try out the HTML to PDF API pdfcrowd.com

Related Tpoics:

- Remove minimum elements from either side such that 2*min becomes more than max
- Divide and Conquer | Set 6 (Search in a Row-wise and Column-wise Sorted 2D Array)
- Bucket Sort
- Kth smallest element in a row-wise and column-wise sorted 2D array | Set 1
- Find the number of zeroes
- Find if there is a subarray with 0 sum
- Divide and Conquer | Set 5 (Strassen's Matrix Multiplication)
- Count all possible groups of size 2 or 3 that have sum as multiple of 3

2 Tweet 0 0

Writing code in comment? Please use **ideone.com** and share the link here.

open in browser PRO version Are you a developer? Try out the HTML to PDF API pdfcrowd.com

705 Subscribe

Recent Comments

Aman Hi, Why arent we checking for conditions...

Write a C program to Delete a Tree. · 15 minutes ago

kzs please provide solution for the problem...

Backtracking | Set 2 (Rat in a Maze) · 19 minutes ago

Sanjay Agarwal bool tree::Root_to_leaf_path_given_sum(tree...

Root to leaf path sum equal to a given number · 44 minutes ago

GOPI GOPINATH @admin Highlight this sentence "We can easily...

Count trailing zeroes in factorial of a number · 45 minutes ago

newCoder3006 If the array contains negative numbers also. We...

Find subarray with given sum · 1 hour ago

newCoder3006 Code without using while loop. We can do it...

Find subarray with given sum · 1 hour ago

open in browser PRO version Are you a developer? Try out the HTML to PDF API pdfcrowd.com

AdChoices
▶ C++ Code
▶ Java Source Code
▶ SUM Function
AdChoices
▶ The SUM of All
▶ Check SUM
▶ SUM Program
AdChoices
▶ SUM To
▶ SUM Time
▶ Programming C++

@geeksforgeeks, **Some rights reserved** **Contact Us!** Powered by **WordPress** & **MooTools**, customized by geeksforgeeks team

open in browser PRO version Are you a developer? Try out the HTML to PDF API pdfcrowd.com