f   🐦   🔊

COMPUTING & TECHNOLOGY

🏠 Home ▸ Algorithms ▸

C++ Coding Exercise – Maximum Subarray (Dynamic Programming and Greedy Algorithm)

Tags: C++ coding exercise, dynamic programming, greedy algorithm, leetcode, maximum subarray

C++ Coding Exercise – Maximum Subarray (Dynamic Programming and Greedy Algorithm)

📅 April 26, 2016   💬 No Comments   🏷 algorithms, c / c++, coding exercise, leetcode online judge

The Permanent URL is: C++ Coding Exercise – Maximum Subarray (Dynamic Programming and Greedy Algorithm (AMP Version)

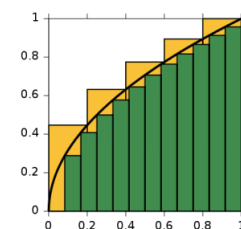> ❝ Find the contiguous subarray within an array (containing at least one number) which has the largest sum. For example, given the array

[−2,1,−3,4,−1,2,1,−5,4], the contiguous subarray [4,−1,2,1] has the largest sum = 6.

DYNAMIC PROGRAMMING

If we use **f(n)** to store the maximum sum that ends at the n-th number in the array, then we have the following Dynamic Programming (DP) recurrence formula:

```
f(0) = num[0]
f(n) = max(f(n-1) + num[n], num[n])
```

So the answer would be the maximum value of f(0) to f(n-1)

```cpp
 1  class Solution {
 2  public:
 3      int maxSubArray(vector<int>& nums) {
 4          int n = nums.size();
 5          vector<int> f(n, INT_MIN);
 6          f[0] = nums[0];
 7          int sum = f[0];
 8          for (int i = 1; i < n; i ++) {
 9              f[i] = max(f[i - 1] + nums[i], nums[i]);
10              sum = max(sum, f[i]);
11          }
12          return sum;
13      }
14  };
```

The time complexity is O(n) and the space complexity is O(n). As each iteration, the DP formula depends on its previous value, so the space can be optimised to O(1).

```cpp
 1  class Solution {
 2  public:
 3      int maxSubArray(vector<int>& nums) {
 4          int n = nums.size();
 5          int prev = nums[0];
 6          int sum = prev;
 7          for (int i = 1; i < n; i ++) {
 8              prev = max(prev + nums[i], nums[i]);
 9              sum = max(sum, prev);
10          }
11          return sum;
12      }
13  };
```

GREEDY ALGORITHM

C/C++ Coding Exercise – Convert a Number to …
15 Comments

When x==x Evaluates to FALSE in C/C++?
9 Comments

How to Monetize Chrome Extension by Injecting Ads …
3 Comments

PPAP in C++ and Javascript for Beginner
2 Comments

How to Link Static Library in C/C++ using …
2 Comments
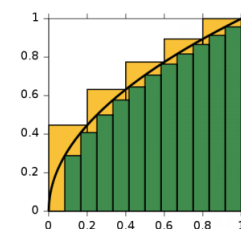
How to Download Tumblr Videos?
2 Comments

CODING FOR SPEED

- Integer Performance

Recommended for you

C++ Function to Compute Numerical I…
helloacm.com

How to Speed Up Parallel Processing us…
helloacm.com

We keep a variable to store the current sum. If the sum is below zero, then we reset it to the current number (start from current number).

```cpp
class Solution {
public:
    int maxSubArray(vector<int>& nums) {
        int sum = 0;
        int curmax = INT_MIN;
        for (int i = 0; i < nums.size(); i ++) {
            if (sum >= 0) {
                sum += nums[i];
            } else {
                sum = nums[i];
            }
            curmax = max(sum, curmax);
        }
        return curmax;
    }
};
```

Similar to DP, this approach is O(n) time with O(1) space.

–EOF (The Ultimate Computing & Technology Blog) —

GD Star Rating

a WordPress rating system

Like 83

The Permanent URL is: C++ Coding Exercise – Maximum Subarray (Dynamic Programming and Greedy Algorithm) (**AMP Version**)
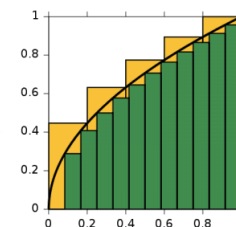
376 words

- Support my work via Donations (Thanks):

- Donate

- bitcoin: **1J88t5UAgKBHhMgzkyH9bpY5mPdCYAe5X**

Last Post: C/C++ Coding Exercise - Find the Duplicate Number

Next Post: C++ Coding Exercise - Sort Colors (Bucket Sort and Dutch Flag)

Share This Article To...

RELATED POSTS:

- ACM Code Submissions with High Rankings
- How to List the Most-Voted Posts in a Year using SQL?
- Coding Exercise – C++ – Codeforces – B. The least round way – Dynamic Programming
- One Simple Equation to Compute e, base of the natural logarithm
- Greedy Algorithm Example – What is the Best Time to Buy and Sell Stock?
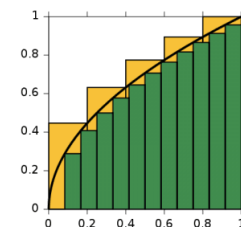- Binary Search Sqrt

Leave a Reply

Comment Text*

Name*

Email*

Website

Post Comment

Recommended for you

C++ Function to Compute Numerical I...

helloacm.com

How to Speed Up Parallel Processing us...

helloacm.com

AddThis

FORUMS

- Data Structure & Algorithms
- How-Tos and Everything Else *
- Programming Languages
- SEO, WordPress, Coding for the Web
- Shell Scripting & Database

FOLLOW US ON TWITTER!

- MSTest - Out of Memory - LAA for 32-bit Test Agent https://t.co/HM3t0vnz3m
  15 hours ago

- SteemIt - Check Who Delegate SP to You https://t.co/lTPgrSYxHs
  yesterday

- How Many Zeros at the end of 1024!?
  https://t.co/Cs0LAm8RcE
  yesterday

- Registry: Add [Run as Administrator] to Right-Click Menu in Windows 10
  https://t.co/61cwKoqhTk
  2 days ago

- jQuery Example - Random Squares
  https://t.co/cwR7gi3DKZ
  3 days ago

RECENT TOPICS

- Adsense Earning Report Nov/2016
- Adsense Earning Report October/2016
- Adsense Earning Report Sept/2016
- Adsense Earning Report Aug/2016
- Adsense Earning Report July/2016
- Adsense Earning Report June/2016

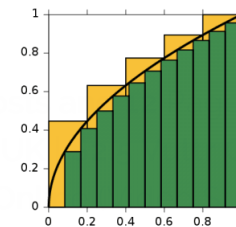## FIND US ON FACEBOOK

Computing & Technol…
2,876 likes

Like Page   Contact Us

Be the first of your friends to like this

Recommended for you

C++ Function to Compute Numerical I…

How to Speed Up Parallel Processing us…

helloacm.com   helloacm.com

AddThis