Problem Solving Workshop #2 Tech Interviews and Competitive Programming Meetup

February 20, 2016 https://www.meetup.com/tech-interviews-and-competitive-programming/

Instructor: Eugene Yarovoi (can be contacted through the group Meetup page above under Organizers)

More practice questions: leetcode.com, glassdoor.com, geeksforgeeks.org
Books: Elements of Programming Interviews, Cracking the Coding Interview
Have questions you want answered? Contact the instructor, or ask on Quora. You can post questions and follow the instructor and other people who write about algorithms.

Try to find optimized solutions, and provide a time and space complexity analysis with every solution for the algorithms questions.

Solutions

Easy Problem

Given an array of 0s and 1s, and an integer k, find the longest contiguous streak of 1s that you can get by changing any k 0s to 1s.

Solution: Build a zeros array denoting the positio+ns of the zeros in the array. For example, array = [1, 0, 0, 0, 1, 1, 1, 0, 1, 1, 0, 1] produces zeroes = [1, 2, 3, 7, 10] (the indexes of the 0s, 0-indexed). Every largest streak of 1s must start either right after a 0 or at the beginning of the array, since if it started after a 1, we would have included that 1 in the streak. Likewise, every largest streak of 1s ends right before a 0 or at the end of the array. Every largest streak of 1s also converts k zeros to ones. Based on this, we conclude we want the maximum of (zeroes[i+k+1] - zeroes[i] - 1) over all possible i. We can easily obtain this in linear time by iterating over the zeros array and updating a maxSoFar variable.

The special case possibility of the streak of 1s beginning at the start of the array or ending at the end of the array can be handled separately as a special case, or better yet, treat the array as having an extra, unchangeable 0 at both ends. View the zeroes array in the example above as [-1, 1, 2, 3, 7, 10, 12].

Medium Problem

Given an array and an integer k, find the maximum of every contiguous subarray of size k.

Solution: http://www.geeksforgeeks.org/maximum-of-all-subarrays-of-size-k/

Hard Problem

Given an array of integers, find the contiguous subarray that produces the largest value when its elements are bitwise XOR'ed together. That is, if the array is A, let XorSubarray(i, j) = a[i] ^ a[i+1] ^ ... ^ a[j-1] ^ a[j], where ^ is the bitwise exclusive or (XOR) operation. Find the i, j that maximize this function.

Solution: http://www.geeksforgeeks.org/find-the-maximum-subarray-xor-in-a-given-array/