课程咨询

一小时梳理2018年秋招必考100题

硅谷程序员直通车（第八版）

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咨询课程

如何梳理一道题？（TIGER）

- 这道题是什么意思？**T**arget
- 面试官的考点是什么？**I**nquire
- 这道题的答案是怎么想到的？**G**et the point
- 解题的模版是什么？**E**nsemble
- 面试官会问哪些变形题和follow up题？**R**eask（口述）

你要做什么？

- 拿出纸和笔，记录每道题的掌握程度
    - 1分：完全不会
    - 2分：有解题思路
    - 3分，可以写出来
    - 4分，可以给别人讲懂
    - 5分，能够回答follow up题

课程咨询

模型分类总结

双针模型：697，632，443，167，121，101，76，56，42，23，21，15，1；
吊桶模型：632，451，347，242，146，128，49，1；
备忘模型：697，632，543，213，198，140，139，123，28；
分治模型：295，236，215，162，89，75，69，66，57，50，48，39，34，33，23，22，21，4；
缓存模型：385，155，150，94，42，20；
遍历模型：398，103，102，101，98，94，28，5；
数学模型：398，119，65，62，31；
演绎模型：547，253，252，188，151，127，123，122，120，116，97，91，70，62，53，50，31，10，5；

题目详解

697. Degree of an Array

Given a non-empty array of non-negative integers `nums`, the **degree** of this array is defined as the maximum frequency of any one of its elements.

Your task is to find the smallest possible length of a (contiguous) subarray of `nums`, that has the same degree as `nums`.

Example 1:

```
Input: [1, 2, 2, 3, 1]
Output: 2
Explanation:
The input array has a degree of 2 because both elements 1 and 2 appear twice.
Of the subarrays that have the same degree:
[1, 2, 2, 3, 1], [1, 2, 2, 3], [2, 2, 3, 1], [1, 2, 2], [2, 2, 3], [2, 2]
The shortest length is 2. So return 2.
```

Example 2:

```
Input: [1,2,2,3,1,4,2]
Output: 6
```

Note:

- `nums.length` will be between 1 and 50,000.
- `nums[i]` will be an integer between 0 and 49,999.

双针模型、备忘模型

632. Smallest Range

You have `k` lists of sorted integers in ascending order. Find the **smallest** range that includes at least one number from each of the `k` lists.

We define the range [a,b] is smaller than range [c,d] if `b-a < d-c` or `a < c` if `b-a == d-c`.

Example 1:

```
Input:[[4,10,15,24,26], [0,9,12,20], [5,18,22,30]]
Output: [20,24]
Explanation:
List 1: [4, 10, 15, 24,26], 24 is in range [20,24].
List 2: [0, 9, 12, 20], 20 is in range [20,24].
List 3: [5, 18, 22, 30], 22 is in range [20,24].
```

Note:

1. The given list may contain duplicates, so ascending order means >= here.
2. 1 <= `k` <= 3500
3. -10^5 <= `value of elements` <= 10^5.
4. **For Java users, please note that the input type has been changed to List<List<Integer>>. And after you reset the code template, you'll see this point.**

双针模型、备忘模型、吊桶模型

547. Friend Circles

There are **N** students in a class. Some of them are friends, while some are not. Their friendship is transitive in nature. For example, if A is a **direct** friend of B, and B is a **direct** friend of C, then A is an **indirect** friend of C. And we defined a friend circle is a group of students who are direct or indirect friends.

Given a **N*N** matrix **M** representing the friend relationship between students in the class. If M[i][j] = 1, then the i_{th} and j_{th} students are **direct** friends with each other, otherwise not. And you have to output the total number of friend circles among all the students.

Example 1:

```
Input:
[[1,1,0],
 [1,1,0],
 [0,0,1]]
Output: 2
Explanation:The 0th and 1st students are direct friends, so they are in a friend circle.
The 2nd student himself is in a friend circle. So return 2.
```

Example 2:

```
Input:
[[1,1,0],
 [1,1,1],
 [0,1,1]]
Output: 1
Explanation:The 0th and 1st students are direct friends, the 1st and 2nd students are direct friends,
so the 0th and 2nd students are indirect friends. All of them are in the same friend circle, so return 1.
```

Note:

1. N is in range [1,200].
2. M[i][i] = 1 for all students.
3. If M[i][j] = 1, then M[j][i] = 1.

演绎模型

543. Diameter of Binary Tree

Given a binary tree, you need to compute the length of the diameter of the tree. The diameter of a binary tree is the length of the **longest** path between any two nodes in a tree. This path may or may not pass through the root.

Example:
Given a binary tree

```
          1
         / \
        2   3
       / \
      4   5
```

Return **3**, which is the length of the path [4,2,1,3] or [5,2,1,3].

Note: The length of path between two nodes is represented by the number of edges between them.

备忘模型

451. Sort Characters By Frequency

Given a string, sort it in decreasing order based on the frequency of characters.

Example 1:

```
Input:
"tree"

Output:
"eert"

Explanation:
'e' appears twice while 'r' and 't' both appear once.
So 'e' must appear before both 'r' and 't'. Therefore "eetr" is also a valid answer.
```

Example 2:

```
Input:
"cccaaa"

Output:
"cccaaa"

Explanation:
Both 'c' and 'a' appear three times, so "aaaccc" is also a valid answer.
Note that "cacaca" is incorrect, as the same characters must be together.
```

Example 3:

```
Input:
"Aabb"

Output:
"bbAa"

Explanation:
"bbaA" is also a valid answer, but "Aabb" is incorrect.
Note that 'A' and 'a' are treated as two different characters.
```

吊桶模型

443. String Compression

Given an array of characters, compress it **in-place**.

The length after compression must always be smaller than or equal to the original array.

Every element of the array should be a **character** (not int) of length 1.

After you are done **modifying the input array in-place**, return the new length of the array.

Follow up:
Could you solve it using only O(1) extra space?

Example 1:

```
Input:
["a","a","b","b","c","c","c"]

Output:
Return 6, and the first 6 characters of the input array should be: ["a","2","b","2","c","3"]

Explanation:
"aa" is replaced by "a2". "bb" is replaced by "b2". "ccc" is replaced by "c3".
```

Example 2:

```
Input:
["a"]

Output:
Return 1, and the first 1 characters of the input array should be: ["a"]

Explanation:
Nothing is replaced.
```

Example 3:

```
Input:
["a","b","b","b","b","b","b","b","b","b","b","b","b"]

Output:
Return 4, and the first 4 characters of the input array should be: ["a","b","1","2"].

Explanation:
Since the character "a" does not repeat, it is not compressed. "bbbbbbbbbbb" is replaced by "b12".
Notice each digit has it's own entry in the array.
```

Note:

1. All characters have an ASCII value in `[35, 126]`.
2. `1 <= len(chars) <= 1000`.

双针模型

398. Random Pick Index

Given an array of integers with possible duplicates, randomly output the index of a given target number. You can assume that the given target number must exist in the array.

Note:
The array size can be very large. Solution that uses too much extra space will not pass the judge.

Example:

```
int[] nums = new int[] {1,2,3,3,3};
Solution solution = new Solution(nums);

// pick(3) should return either index 2, 3, or 4 randomly. Each index should have equal probability of returning.
solution.pick(3);

// pick(1) should return 0. Since in the array only nums[0] is equal to 1.
solution.pick(1);
```

遍历模型、数学模型

385. Mini Parser

Given a nested list of integers represented as a string, implement a parser to deserialize it.

Each element is either an integer, or a list -- whose elements may also be integers or other lists.

Note: You may assume that the string is well-formed:

- String is non-empty.
- String does not contain white spaces.
- String contains only digits `0-9`, `[`, `-`, `,`, `]`.

Example 1:

```
Given s = "324",

You should return a NestedInteger object which contains a single integer 324.
```

Example 2:

```
Given s = "[123,[456,[789]]]",

Return a NestedInteger object containing a nested list with 2 elements:

1. An integer containing value 123.
2. A nested list containing two elements:
    i.  An integer containing value 456.
    ii. A nested list with one element:
         a. An integer containing value 789.
```

缓存模型

347. Top K Frequent Elements

Given a non-empty array of integers, return the ***k*** most frequent elements.

For example,
Given `[1,1,1,2,2,3]` and k = 2, return `[1,2]`.

Note:

- You may assume *k* is always valid, 1 ≤ *k* ≤ number of unique elements.
- Your algorithm's time complexity **must be** better than O(*n* log *n*), where *n* is the array's size.

吊桶模型

295. Find Median from Data Stream

Median is the middle value in an ordered integer list. If the size of the list is even, there is no middle value. So the median is the mean of the two middle value.

Examples:
`[2,3,4]`, the median is `3`

`[2,3]`, the median is `(2 + 3) / 2 = 2.5`

Design a data structure that supports the following two operations:

- void addNum(int num) - Add a integer number from the data stream to the data structure.
- double findMedian() - Return the median of all elements so far.

For example:

```
addNum(1)
addNum(2)
findMedian() -> 1.5
addNum(3)
findMedian() -> 2
```

分治模型

253. Meeting Rooms II

Given an array of meeting time intervals consisting of start and end times `[[s1,e1],[s2,e2],...]` ($s_i < e_i$), find the minimum number of conference rooms required.

For example,
Given `[[0, 30],[5, 10],[15, 20]]`,
return `2`.

演绎模型

252. Meeting Rooms

Given an array of meeting time intervals consisting of start and end times `[[s1,e1],[s2,e2],...]` ($s_i < e_i$), determine if a person could attend all meetings.

For example,
Given `[[0, 30],[5, 10],[15, 20]]`,
return `false`.

演绎模型

242. Valid Anagram

Given two strings *s* and *t*, write a function to determine if *t* is an anagram of *s*.

For example,
s = "anagram", *t* = "nagaram", return true.
s = "rat", *t* = "car", return false.

Note:
You may assume the string contains only lowercase alphabets.

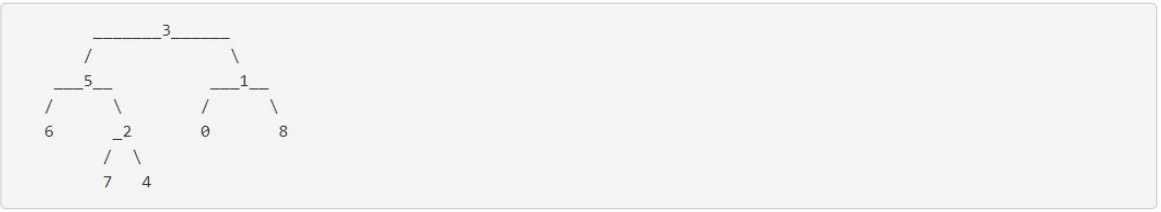
Follow up:
What if the inputs contain unicode characters? How would you adapt your solution to such case?

吊桶模型

236. Lowest Common Ancestor of a Binary Tree

Given a binary tree, find the lowest common ancestor (LCA) of two given nodes in the tree.

According to the definition of LCA on Wikipedia: "The lowest common ancestor is defined between two nodes v and w as the lowest node in T that has both v and w as descendants (where we allow **a node to be a descendant of itself**)."



For example, the lowest common ancestor (LCA) of nodes `5` and `1` is `3`. Another example is LCA of nodes `5` and `4` is `5`, since a node can be a descendant of itself according to the LCA definition.

分治模型

215. Kth Largest Element in an Array

Find the **k**th largest element in an unsorted array. Note that it is the kth largest element in the sorted order, not the kth distinct element.
For example,
Given `[3,2,1,5,6,4]` and k = 2, return 5.

Note:
You may assume k is always valid, 1 ≤ k ≤ array's length.

Credits:
Special thanks to @mithmatt for adding this problem and creating all test cases.

分治模型

213. House Robber II

Note: This is an extension of House Robber.

After robbing those houses on that street, the thief has found himself a new place for his thievery so that he will not get too much attention. This time, all houses at this place are **arranged in a circle.** That means the first house is the neighbor of the last one. Meanwhile, the security system for these houses remain the same as for those in the previous street.

Given a list of non-negative integers representing the amount of money of each house, determine the maximum amount of money you can rob tonight **without alerting the police**.

Credits:
Special thanks to @Freezen for adding this problem and creating all test cases.

备忘模型

198. House Robber

You are a professional robber planning to rob houses along a street. Each house has a certain amount of money stashed, the only constraint stopping you from robbing each of them is that adjacent houses have security system connected and **it will automatically contact the police if two adjacent houses were broken into on the same night**.

Given a list of non-negative integers representing the amount of money of each house, determine the maximum amount of money you can rob tonight **without alerting the police**.

Credits:
Special thanks to @ifanchu for adding this problem and creating all test cases. Also thanks to @ts for adding additional test cases.

备忘模型

188. Best Time to Buy and Sell Stock IV

Say you have an array for which the i^{th} element is the price of a given stock on day *i*.

Design an algorithm to find the maximum profit. You may complete at most **k** transactions.

Note:
You may not engage in multiple transactions at the same time (ie, you must sell the stock before you buy again).

演绎模型

173. Binary Search Tree Iterator

Implement an iterator over a binary search tree (BST). Your iterator will be initialized with the root node of a BST.

Calling `next()` will return the next smallest number in the BST.

Note: `next()` and `hasNext()` should run in average O(1) time and uses O(*h*) memory, where *h* is the height of the tree.

Credits:
Special thanks to @ts for adding this problem and creating all test cases.

构建模型

167. Two Sum II - Input array is sorted

Given an array of integers that is already ***sorted in ascending order***, find two numbers such that they add up to a specific target number.

The function twoSum should return indices of the two numbers such that they add up to the target, where index1 must be less than index2. Please note that your returned answers (both index1 and index2) are not zero-based.

You may assume that each input would have *exactly* one solution and you may not use the *same* element twice.

```
Input: numbers={2, 7, 11, 15}, target=9
Output: index1=1, index2=2
```

双针模型

166. Fraction to Recurring Decimal

Given two integers representing the numerator and denominator of a fraction, return the fraction in string format.

If the fractional part is repeating, enclose the repeating part in parentheses.

For example,

- Given numerator = 1, denominator = 2, return "0.5".
- Given numerator = 2, denominator = 1, return "2".
- Given numerator = 2, denominator = 3, return "0.(6)".

Credits:
Special thanks to @Shangrila for adding this problem and creating all test cases.

构建模型

162. Find Peak Element

A peak element is an element that is greater than its neighbors.

Given an input array where `num[i] ≠ num[i+1]`, find a peak element and return its index.

The array may contain multiple peaks, in that case return the index to any one of the peaks is fine.

You may imagine that `num[-1] = num[n] = -∞`.

For example, in array `[1, 2, 3, 1]`, 3 is a peak element and your function should return the index number 2.

click to show spoilers.

Credits:
Special thanks to @ts for adding this problem and creating all test cases.

分治模型

155. Min Stack

Design a stack that supports push, pop, top, and retrieving the minimum element in constant time.

- push(x) -- Push element x onto stack.
- pop() -- Removes the element on top of the stack.
- top() -- Get the top element.
- getMin() -- Retrieve the minimum element in the stack.

Example:

```
MinStack minStack = new MinStack();
minStack.push(-2);
minStack.push(0);
minStack.push(-3);
minStack.getMin();   --> Returns -3.
minStack.pop();
minStack.top();      --> Returns 0.
minStack.getMin();   --> Returns -2.
```

缓存模型

151. Reverse Words in a String

Given an input string, reverse the string word by word.

For example,
Given s = "`the sky is blue`",
return "`blue is sky the`".

Update (2015-02-12):
For C programmers: Try to solve it *in-place* in *O*(1) space.

演绎模型

150. Evaluate Reverse Polish Notation

Evaluate the value of an arithmetic expression in Reverse Polish Notation.

Valid operators are `+`, `-`, `*`, `/`. Each operand may be an integer or another expression.

Some examples:

```
["2", "1", "+", "3", "*"] -> ((2 + 1) * 3) -> 9
["4", "13", "5", "/", "+"] -> (4 + (13 / 5)) -> 6
```

缓存模型

149. Max Points on a Line

Given *n* points on a 2D plane, find the maximum number of points that lie on the same straight line.

构建模型

146. LRU Cache

Design and implement a data structure for Least Recently Used (LRU) cache. It should support the following operations: `get` and `put`.

`get(key)` - Get the value (will always be positive) of the key if the key exists in the cache, otherwise return -1.
`put(key, value)` - Set or insert the value if the key is not already present. When the cache reached its capacity, it should invalidate the least recently used item before inserting a new item.

Follow up:
Could you do both operations in **O(1)** time complexity?

Example:

```
LRUCache cache = new LRUCache( 2 /* capacity */ );

cache.put(1, 1);
cache.put(2, 2);
cache.get(1);       // returns 1
cache.put(3, 3);    // evicts key 2
cache.get(2);       // returns -1 (not found)
cache.put(4, 4);    // evicts key 1
cache.get(1);       // returns -1 (not found)
cache.get(3);       // returns 3
cache.get(4);       // returns 4
```

构建模型、吊桶模型

140. Word Break II

Given a **non-empty** string *s* and a dictionary *wordDict* containing a list of **non-empty** words, add spaces in *s* to construct a sentence where each word is a valid dictionary word. You may assume the dictionary does not contain duplicate words.

Return all such possible sentences.

For example, given
s = `"catsanddog"`,
dict = `["cat", "cats", "and", "sand", "dog"]`.

A solution is `["cats and dog", "cat sand dog"]`.

UPDATE (2017/1/4):
The *wordDict* parameter had been changed to a list of strings (instead of a set of strings). Please reload the code definition to get the latest changes.

备忘模型、构建模型

139. Word Break

Given a **non-empty** string *s* and a dictionary *wordDict* containing a list of **non-empty** words, determine if *s* can be segmented into a space-separated sequence of one or more dictionary words. You may assume the dictionary does not contain duplicate words.

For example, given
s = `"leetcode"`,
dict = `["leet", "code"]`.

Return true because `"leetcode"` can be segmented as `"leet code"`.

UPDATE (2017/1/4):
The *wordDict* parameter had been changed to a list of strings (instead of a set of strings). Please reload the code definition to get the latest changes.

备忘模型

128. Longest Consecutive Sequence

Given an unsorted array of integers, find the length of the longest consecutive elements sequence.

For example,
Given `[100, 4, 200, 1, 3, 2]`,
The longest consecutive elements sequence is `[1, 2, 3, 4]`. Return its length: `4`.

Your algorithm should run in O(*n*) complexity.

吊桶模型、构建模型

127. Word Ladder

Given two words (*beginWord* and *endWord*), and a dictionary's word list, find the length of shortest transformation sequence from *beginWord* to *endWord*, such that:

1. Only one letter can be changed at a time.
2. Each transformed word must exist in the word list. Note that *beginWord* is *not* a transformed word.

For example,

Given:
beginWord = `"hit"`
endWord = `"cog"`
wordList = `["hot","dot","dog","lot","log","cog"]`

As one shortest transformation is `"hit" -> "hot" -> "dot" -> "dog" -> "cog"`,
return its length `5`.

Note:

- Return 0 if there is no such transformation sequence.
- All words have the same length.
- All words contain only lowercase alphabetic characters.
- You may assume no duplicates in the word list.
- You may assume *beginWord* and *endWord* are non-empty and are not the same.

UPDATE (2017/1/20):
The *wordList* parameter had been changed to a list of strings (instead of a set of strings). Please reload the code definition to get the latest changes.

演绎模型

123. Best Time to Buy and Sell Stock III

Say you have an array for which the i^{th} element is the price of a given stock on day *i*.

Design an algorithm to find the maximum profit. You may complete at most *two* transactions.

Note:
You may not engage in multiple transactions at the same time (ie, you must sell the stock before you buy again).

备忘模型、演绎模型

122. Best Time to Buy and Sell Stock II

Say you have an array for which the i^{th} element is the price of a given stock on day *i*.

Design an algorithm to find the maximum profit. You may complete as many transactions as you like (ie, buy one and sell one share of the stock multiple times). However, you may not engage in multiple transactions at the same time (ie, you must sell the stock before you buy again).

演绎模型

121. Best Time to Buy and Sell Stock

Say you have an array for which the i^{th} element is the price of a given stock on day *i*.

If you were only permitted to complete at most one transaction (ie, buy one and sell one share of the stock), design an algorithm to find the maximum profit.

Example 1:

```
Input: [7, 1, 5, 3, 6, 4]
Output: 5

max. difference = 6-1 = 5 (not 7-1 = 6, as selling price needs to be larger than buying price)
```

Example 2:

```
Input: [7, 6, 4, 3, 1]
Output: 0

In this case, no transaction is done, i.e. max profit = 0.
```

双针模型

120. Triangle

Given a triangle, find the minimum path sum from top to bottom. Each step you may move to adjacent numbers on the row below.

For example, given the following triangle

```
[
     [2],
    [3,4],
   [6,5,7],
  [4,1,8,3]
]
```

The minimum path sum from top to bottom is `11` (i.e., 2 + 3 + 5 + 1 = 11).

Note:
Bonus point if you are able to do this using only *O*(*n*) extra space, where *n* is the total number of rows in the triangle.

演绎模型

119. Pascal's Triangle II

Given an index *k*, return the k^{th} row of the Pascal's triangle.

For example, given *k* = 3,
Return `[1,3,3,1]`.

Note:
Could you optimize your algorithm to use only *O*(*k*) extra space?

构建模型、数学模型

116. Populating Next Right Pointers in Each Node

Given a binary tree

```
struct TreeLinkNode {
  TreeLinkNode *left;
  TreeLinkNode *right;
  TreeLinkNode *next;
}
```

Populate each next pointer to point to its next right node. If there is no next right node, the next pointer should be set to `NULL`.

Initially, all next pointers are set to `NULL`.

Note:

- You may only use constant extra space.
- You may assume that it is a perfect binary tree (ie, all leaves are at the same level, and every parent has two children).

For example,
Given the following perfect binary tree,

```
     1
   /  \
  2    3
 / \  / \
4  5  6  7
```

After calling your function, the tree should look like:

```
     1 -> NULL
   /  \
  2 -> 3 -> NULL
 / \  / \
4->5->6->7 -> NULL
```

演绎模型、构建模型

114. Flatten Binary Tree to Linked List

Given a binary tree, flatten it to a linked list in-place.

For example,
Given

```
        1
       / \
      2   5
     / \   \
    3   4   6
```

The flattened tree should look like:

```
1
 \
  2
   \
    3
     \
      4
       \
        5
         \
          6
```

构建模型

110. Balanced Binary Tree

Given a binary tree, determine if it is height-balanced.

For this problem, a height-balanced binary tree is defined as:

> a binary tree in which the depth of the two subtrees of *every* node never differ by more than 1.

Example 1:

Given the following tree `[3,9,20,null,null,15,7]`:

```
    3
   / \
  9  20
    /  \
   15   7
```

Return true.

Example 2:

Given the following tree `[1,2,2,3,3,null,null,4,4]`:

```
       1
      / \
     2   2
    / \
   3   3
  / \
 4   4
```

Return false.

构建模型

104. Maximum Depth of Binary Tree

Given a binary tree, find its maximum depth.

The maximum depth is the number of nodes along the longest path from the root node down to the farthest leaf node.

构建模型

103. Binary Tree Zigzag Level Order Traversal

Given a binary tree, return the *zigzag level order* traversal of its nodes' values. (ie, from left to right, then right to left for the next level and alternate between).

For example:
Given binary tree `[3,9,20,null,null,15,7]`,

```
    3
   / \
  9  20
    /  \
   15   7
```

return its zigzag level order traversal as:

```
[
  [3],
  [20,9],
  [15,7]
]
```

遍历模型

102. Binary Tree Level Order Traversal

Given a binary tree, return the *level order* traversal of its nodes' values. (ie, from left to right, level by level).

For example:
Given binary tree `[3,9,20,null,null,15,7]`,

```
    3
   / \
  9  20
    /  \
   15   7
```

return its level order traversal as:

```
[
  [3],
  [9,20],
  [15,7]
]
```

遍历模型

101. Symmetric Tree

Given a binary tree, check whether it is a mirror of itself (ie, symmetric around its center).

For example, this binary tree `[1,2,2,3,4,4,3]` is symmetric:

```
    1
   / \
  2   2
 / \ / \
3  4 4  3
```

But the following `[1,2,2,null,3,null,3]` is not:

```
    1
   / \
  2   2
   \   \
   3    3
```

Note:
Bonus points if you could solve it both recursively and iteratively.

遍历模型、双针模型

98. Validate Binary Search Tree

Given a binary tree, determine if it is a valid binary search tree (BST).

Assume a BST is defined as follows:

- The left subtree of a node contains only nodes with keys **less than** the node's key.
- The right subtree of a node contains only nodes with keys **greater than** the node's key.
- Both the left and right subtrees must also be binary search trees.

Example 1:

```
    2
   / \
  1   3
```

Binary tree `[2,1,3]`, return true.

Example 2:

```
    1
   / \
  2   3
```

Binary tree `[1,2,3]`, return false.

遍历模型

97. Interleaving String

Given *s1*, *s2*, *s3*, find whether *s3* is formed by the interleaving of *s1* and *s2*.

For example,
Given:
s1 = `"aabcc"`,
s2 = `"dbbca"`,

When *s3* = `"aadbbcbcac"`, return true.
When *s3* = `"aadbbbaccc"`, return false.

演绎模型

94. Binary Tree Inorder Traversal

Given a binary tree, return the *inorder* traversal of its nodes' values.

For example:
Given binary tree `[1,null,2,3]`,

```
   1
    \
     2
    /
   3
```

return `[1,3,2]`.

Note: Recursive solution is trivial, could you do it iteratively?

遍历模型、缓存模型

91. Decode Ways

A message containing letters from `A-Z` is being encoded to numbers using the following mapping:

```
'A' -> 1
'B' -> 2
...
'Z' -> 26
```

Given an encoded message containing digits, determine the total number of ways to decode it.

For example,
Given encoded message `"12"`, it could be decoded as `"AB"` (1 2) or `"L"` (12).

The number of ways decoding `"12"` is 2.

演绎模型

89. Gray Code

The gray code is a binary numeral system where two successive values differ in only one bit.

Given a non-negative integer *n* representing the total number of bits in the code, print the sequence of gray code. A gray code sequence must begin with 0.

For example, given *n* = 2, return `[0,1,3,2]`. Its gray code sequence is:

```
00 - 0
01 - 1
11 - 3
10 - 2
```

Note:
For a given *n*, a gray code sequence is not uniquely defined.

For example, `[0,2,3,1]` is also a valid gray code sequence according to the above definition.

For now, the judge is able to judge based on one instance of gray code sequence. Sorry about that.

分治模型、构造模型

78. Subsets

Given a set of **distinct** integers, *nums*, return all possible subsets (the power set).

Note: The solution set must not contain duplicate subsets.

For example,
If ***nums*** = `[1,2,3]`, a solution is:

```
[
  [3],
  [1],
  [2],
  [1,2,3],
  [1,3],
  [2,3],
  [1,2],
  []
]
```

构建模型

76. Minimum Window Substring

Given a string S and a string T, find the minimum window in S which will contain all the characters in T in complexity O(n).

For example,
S = `"ADOBECODEBANC"`
T = `"ABC"`

Minimum window is `"BANC"`.

Note:
If there is no such window in S that covers all characters in T, return the empty string `""`.

If there are multiple such windows, you are guaranteed that there will always be only one unique minimum window in S.

双针模型

75. Sort Colors

Given an array with *n* objects colored red, white or blue, sort them so that objects of the same color are adjacent, with the colors in the order red, white and blue.

Here, we will use the integers 0, 1, and 2 to represent the color red, white, and blue respectively.

Note:
You are not suppose to use the library's sort function for this problem.

分治模型

73. Set Matrix Zeroes

Given a *m* x *n* matrix, if an element is 0, set its entire row and column to 0. Do it in place.

构建模型

70. Climbing Stairs

You are climbing a stair case. It takes *n* steps to reach to the top.

Each time you can either climb 1 or 2 steps. In how many distinct ways can you climb to the top?

Note: Given *n* will be a positive integer.

Example 1:

```
Input: 2
Output:  2
Explanation:  There are two ways to climb to the top.

1. 1 step + 1 step
2. 2 steps
```

Example 2:

```
Input: 3
Output:  3
Explanation:  There are three ways to climb to the top.

1. 1 step + 1 step + 1 step
2. 1 step + 2 steps
3. 2 steps + 1 step
```

演绎模型

69. Sqrt(x)

Implement `int sqrt(int x)`.

Compute and return the square root of *x*.

x is guaranteed to be a non-negative integer.

Example 1:

```
Input: 4
Output: 2
```

Example 2:

```
Input: 8
Output: 2
Explanation: The square root of 8 is 2.82842..., and since we want to return an integer, the decimal part will be tru
```

分治模型

68. Text Justification

Given an array of words and a length *L*, format the text such that each line has exactly *L* characters and is fully (left and right) justified.

You should pack your words in a greedy approach; that is, pack as many words as you can in each line. Pad extra spaces `' '` when necessary so that each line has exactly *L* characters.

Extra spaces between words should be distributed as evenly as possible. If the number of spaces on a line do not divide evenly between words, the empty slots on the left will be assigned more spaces than the slots on the right.

For the last line of text, it should be left justified and no extra space is inserted between words.

For example,
words: `["This", "is", "an", "example", "of", "text", "justification."]`
L: `16`.

Return the formatted lines as:

```
[
   "This    is    an",
   "example  of text",
   "justification.  "
]
```

Note: Each word is guaranteed not to exceed *L* in length.

构建模型

67. Add Binary

Given two binary strings, return their sum (also a binary string).

For example,
a = `"11"`
b = `"1"`
Return `"100"`.

构建模型

66. Plus One

Given a non-negative integer represented as a **non-empty** array of digits, plus one to the integer.

You may assume the integer do not contain any leading zero, except the number 0 itself.

The digits are stored such that the most significant digit is at the head of the list.

构建模型、分治模型

65. Valid Number

Validate if a given string is numeric.

Some examples:
`"0"` => `true`
`" 0.1 "` => `true`
`"abc"` => `false`
`"1 a"` => `false`
`"2e10"` => `true`

Note: It is intended for the problem statement to be ambiguous. You should gather all requirements up front before implementing one.

Update (2015-02-10):
The signature of the `C++` function had been updated. If you still see your function signature accepts a `const char *` argument, please click the reload button to reset your code definition.

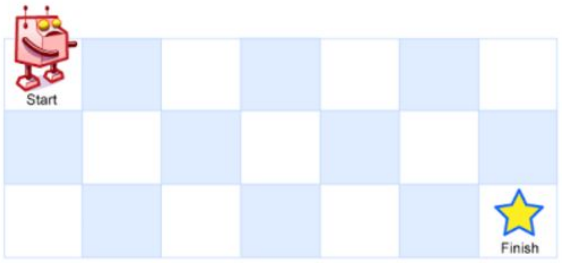
构建模型、数学模型

62. Unique Paths

A robot is located at the top-left corner of a *m* x *n* grid (marked 'Start' in the diagram below).

The robot can only move either down or right at any point in time. The robot is trying to reach the bottom-right corner of the grid (marked 'Finish' in the diagram below).

How many possible unique paths are there?



Above is a 3 x 7 grid. How many possible unique paths are there?

Note: *m* and *n* will be at most 100.

演绎模型、数学模型

57. Insert Interval

Given a set of *non-overlapping* intervals, insert a new interval into the intervals (merge if necessary).

You may assume that the intervals were initially sorted according to their start times.

Example 1:

Given intervals `[1,3],[6,9]`, insert and merge `[2,5]` in as `[1,5],[6,9]`.

Example 2:

Given `[1,2],[3,5],[6,7],[8,10],[12,16]`, insert and merge `[4,9]` in as `[1,2],[3,10],[12,16]`.

This is because the new interval `[4,9]` overlaps with `[3,5],[6,7],[8,10]`.

构建模型、分治模型

56. Merge Intervals

Given a collection of intervals, merge all overlapping intervals.

For example,

Given `[1,3],[2,6],[8,10],[15,18]`,

return `[1,6],[8,10],[15,18]`.

双针模型

54. Spiral Matrix

Given a matrix of *m* x *n* elements (*m* rows, *n* columns), return all elements of the matrix in spiral order.

For example,

Given the following matrix:

```
[
 [ 1, 2, 3 ],
 [ 4, 5, 6 ],
 [ 7, 8, 9 ]
]
```

You should return `[1,2,3,6,9,8,7,4,5]`.

构建模型

53. Maximum Subarray

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`.

More practice:

If you have figured out the O(*n*) solution, try coding another solution using the divide and conquer approach, which is more subtle.

演绎模型

50. Pow(x, n)

课程咨询

Implement pow(*x*, *n*).

Example 1:

```
Input: 2.00000, 10
Output: 1024.00000
```

Example 2:

```
Input: 2.10000, 3
Output: 9.26100
```

分治模型、演绎模型

49. Group Anagrams

Given an array of strings, group anagrams together.

For example, given: `["eat", "tea", "tan", "ate", "nat", "bat"]`,
Return:

```
[
  ["ate", "eat","tea"],
  ["nat","tan"],
  ["bat"]
]
```

Note: All inputs will be in lower-case.

吊桶模型

48. Rotate Image

You are given an *n* x *n* 2D matrix representing an image.

Rotate the image by 90 degrees (clockwise).

Note:
You have to rotate the image **in-place**, which means you have to modify the input 2D matrix directly. **DO NOT** allocate another 2D matrix and do the rotation.

Example 1:

```
Given input matrix =
[
  [1,2,3],
  [4,5,6],
  [7,8,9]
],

rotate the input matrix in-place such that it becomes:
[
  [7,4,1],
  [8,5,2],
  [9,6,3]
]
```

Example 2:

```
Given input matrix =
[
  [ 5, 1, 9,11],
  [ 2, 4, 8,10],
  [13, 3, 6, 7],
  [15,14,12,16]
],

rotate the input matrix in-place such that it becomes:
[
  [15,13, 2, 5],
  [14, 3, 4, 1],
  [12, 6, 8, 9],
  [16, 7,10,11]
]
```

分治模型

47. Permutations II

Given a collection of numbers that might contain duplicates, return all possible unique permutations.

For example,
`[1,1,2]` have the following unique permutations:

```
[
  [1,1,2],
  [1,2,1],
  [2,1,1]
]
```

构建模型

46. Permutations

Given a collection of **distinct** numbers, return all possible permutations.

For example,
`[1,2,3]` have the following permutations:

```
[
  [1,2,3],
  [1,3,2],
  [2,1,3],
  [2,3,1],
  [3,1,2],
  [3,2,1]
]
```

构建模型

43. Multiply Strings

Given two non-negative integers `num1` and `num2` represented as strings, return the product of `num1` and `num2`.

Note:

1. The length of both `num1` and `num2` is < 110.
2. Both `num1` and `num2` contains only digits `0-9`.
3. Both `num1` and `num2` does not contain any leading zero.
4. You **must not use any built-in BigInteger library** or **convert the inputs to integer** directly.

构建模型

42. Trapping Rain Water

Given *n* non-negative integers representing an elevation map where the width of each bar is 1, compute how much water it is able to trap after raining.

For example,
Given `[0,1,0,2,1,0,1,3,2,1,2,1]`, return `6`.

The above elevation map is represented by array [0,1,0,2,1,0,1,3,2,1,2,1]. In this case, 6 units of rain water (blue section) are being trapped. **Thanks Marcos** for contributing this image!

双针模型、缓存模型

39. Combination Sum

Given a **set** of candidate numbers (***C***) **(without duplicates)** and a target number (***T***), find all unique combinations in ***C*** where the candidate numbers sums to ***T***.

The **same** repeated number may be chosen from ***C*** unlimited number of times.

Note:

- All numbers (including target) will be positive integers.
- The solution set must not contain duplicate combinations.

For example, given candidate set `[2, 3, 6, 7]` and target `7`,
A solution set is:

```
[
  [7],
  [2, 2, 3]
]
```

分治模型、构建模型、剪枝模型

38. Count and Say

The count-and-say sequence is the sequence of integers with the first five terms as following:

```
1.     1
2.     11
3.     21
4.     1211
5.     111221
```

`1` is read off as `"one 1"` or `11`.
`11` is read off as `"two 1s"` or `21`.
`21` is read off as `"one 2`, then `one 1"` or `1211`.

Given an integer *n*, generate the n^{th} term of the count-and-say sequence.

Note: Each term of the sequence of integers will be represented as a string.

Example 1:

```
Input: 1
Output: "1"
```

Example 2:

```
Input: 4
Output: "1211"
```

构建模型

34. Search for a Range

Given an array of integers sorted in ascending order, find the starting and ending position of a given target value.

Your algorithm's runtime complexity must be in the order of *O*(log *n*).

If the target is not found in the array, return `[-1, -1]`.

For example,
Given `[5, 7, 7, 8, 8, 10]` and target value 8,
return `[3, 4]`.

分治模型

33. Search in Rotated Sorted Array

Suppose an array sorted in ascending order is rotated at some pivot unknown to you beforehand.

(i.e., `0 1 2 4 5 6 7` might become `4 5 6 7 0 1 2`).

You are given a target value to search. If found in the array return its index, otherwise return -1.

You may assume no duplicate exists in the array.

分治模型

31. Next Permutation

Implement next permutation, which rearranges numbers into the lexicographically next greater permutation of numbers.

If such arrangement is not possible, it must rearrange it as the lowest possible order (ie, sorted in ascending order).

The replacement must be in-place, do not allocate extra memory.

Here are some examples. Inputs are in the left-hand column and its corresponding outputs are in the right-hand column.

`1,2,3` → `1,3,2`

`3,2,1` → `1,2,3`

`1,1,5` → `1,5,1`

数学模型、演绎模型

28. Implement strStr()

Implement strStr().

Return the index of the first occurrence of needle in haystack, or **-1** if needle is not part of haystack.

Example 1:

```
Input: haystack = "hello", needle = "ll"
Output: 2
```

Example 2:

```
Input: haystack = "aaaaa", needle = "bba"
Output: -1
```

遍历模型、备忘算法

26. Remove Duplicates from Sorted Array

Given a sorted array, remove the duplicates **in-place** such that each element appear only *once* and return the new length.

Do not allocate extra space for another array, you must do this by **modifying the input array in-place** with O(1) extra memory.

Example:

```
Given nums = [1,1,2],

Your function should return length = 2, with the first two elements of nums being 1 and 2 respectively.
It doesn't matter what you leave beyond the new length.
```

双针模型

23. Merge k Sorted Lists

Merge *k* sorted linked lists and return it as one sorted list. Analyze and describe its complexity.

双针模型、分治模型

22. Generate Parentheses

Given *n* pairs of parentheses, write a function to generate all combinations of well-formed parentheses.

For example, given *n* = 3, a solution set is:

```
[
  "((()))",
  "(()())",
  "(())()",
  "()(())",
  "()()()"
]
```

构建模型、分治模型

21. Merge Two Sorted Lists

Merge two sorted linked lists and return it as a new list. The new list should be made by splicing together the nodes of the first two lists.

Example:

```
Input: 1->2->4, 1->3->4
Output: 1->1->2->3->4->4
```

双针模型、构建模型、分治模型

20. Valid Parentheses

Given a string containing just the characters `'('`, `')'`, `'{'`, `'}'`, `'['` and `']'`, determine if the input string is valid.

The brackets must close in the correct order, `"()"` and `"()[]{}"` are all valid but `"(]"` and `"([)]"` are not.

缓存模型

17. Letter Combinations of a Phone Number

Given a digit string, return all possible letter combinations that the number could represent.

A mapping of digit to letters (just like on the telephone buttons) is given below.


```
Input:Digit string "23"
Output: ["ad", "ae", "af", "bd", "be", "bf", "cd", "ce", "cf"].
```

Note:

Although the above answer is in lexicographical order, your answer could be in any order you want.

构建模型

15. 3Sum

Given an array *S* of *n* integers, are there elements *a*, *b*, *c* in *S* such that *a* + *b* + *c* = 0? Find all unique triplets in the array which gives the sum of zero.

Note: The solution set must not contain duplicate triplets.

```
For example, given array S = [-1, 0, 1, 2, -1, -4],

A solution set is:
[
  [-1, 0, 1],
  [-1, -1, 2]
]
```

双针模型

13. Roman to Integer

Given a roman numeral, convert it to an integer.

Input is guaranteed to be within the range from 1 to 3999.

构建模型

10. Regular Expression Matching

Implement regular expression matching with support for `'.'` and `'*'`.

```
'.' Matches any single character.
'*' Matches zero or more of the preceding element.

The matching should cover the entire input string (not partial).

The function prototype should be:
bool isMatch(const char *s, const char *p)

Some examples:
isMatch("aa","a") → false
isMatch("aa","aa") → true
isMatch("aaa","aa") → false
isMatch("aa", "a*") → true
isMatch("aa", ".*") → true
isMatch("ab", ".*") → true
isMatch("aab", "c*a*b") → true
```

演绎模型

8. String to Integer (atoi)

Implement `atoi` to convert a string to an integer.

Hint: Carefully consider all possible input cases. If you want a challenge, please do not see below and ask yourself what are the possible input cases.

Notes: It is intended for this problem to be specified vaguely (ie, no given input specs). You are responsible to gather all the input requirements up front.

Requirements for atoi:

The function first discards as many whitespace characters as necessary until the first non-whitespace character is found. Then, starting from this character, takes an optional initial plus or minus sign followed by as many numerical digits as possible, and interprets them as a numerical value.

The string can contain additional characters after those that form the integral number, which are ignored and have no effect on the behavior of this function.

If the first sequence of non-whitespace characters in str is not a valid integral number, or if no such sequence exists because either str is empty or it contains only whitespace characters, no conversion is performed.

If no valid conversion could be performed, a zero value is returned. If the correct value is out of the range of representable values, INT_MAX (2147483647) or INT_MIN (-2147483648) is returned.

构建模型

5. Longest Palindromic Substring

Given a string **s**, find the longest palindromic substring in **s**. You may assume that the maximum length of **s** is 1000.

Example:

```
Input: "babad"

Output: "bab"

Note: "aba" is also a valid answer.
```

Example:

```
Input: "cbbd"

Output: "bb"
```

演绎模型、遍历模型

4. Median of Two Sorted Arrays

课程咨询

There are two sorted arrays **nums1** and **nums2** of size m and n respectively.

Find the median of the two sorted arrays. The overall run time complexity should be O(log (m+n)).

Example 1:

```
nums1 = [1, 3]
nums2 = [2]

The median is 2.0
```

Example 2:

```
nums1 = [1, 2]
nums2 = [3, 4]

The median is (2 + 3)/2 = 2.5
```

分治模型

3. Longest Substring Without Repeating Characters

Given a string, find the length of the **longest substring** without repeating characters.

Examples:

Given `"abcabcbb"`, the answer is `"abc"`, which the length is 3.

Given `"bbbbb"`, the answer is `"b"`, with the length of 1.

Given `"pwwkew"`, the answer is `"wke"`, with the length of 3. Note that the answer must be a **substring**, `"pwke"` is a *subsequence* and not a substring.

双针模型

2. Add Two Numbers

You are given two **non-empty** linked lists representing two non-negative integers. The digits are stored in **reverse order** and each of their nodes contain a single digit. Add the two numbers and return it as a linked list.

You may assume the two numbers do not contain any leading zero, except the number 0 itself.

Example

```
Input: (2 -> 4 -> 3) + (5 -> 6 -> 4)
Output: 7 -> 0 -> 8
Explanation: 342 + 465 = 807.
```

构建模型

1. Two Sum

Given an array of integers, return **indices** of the two numbers such that they add up to a specific target.

You may assume that each input would have ***exactly*** one solution, and you may not use the *same* element twice.

Example:

```
Given nums = [2, 7, 11, 15], target = 9,

Because nums[0] + nums[1] = 2 + 7 = 9,
return [0, 1].
```

吊桶模型、双针模型