力扣常见题目总结

source:

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图 Graph

1. 图的遍历: BFS，DFS，准备模板

2. 图: 三类

    1. 常规的node和edge的图，建adj matrix然后遍历 (690. Employee Importance)
    2. 把矩阵看成图，4周neighbor相连 (0-1 Islands系列, 79. Word Search, 417. Pacific Atlantic Water Flow)
    3. 把data(state)看成node，把操作operation看成edge (127. Word Ladder, 1345. Jump Game IV)，这种思路很多时候就变成了动态规划题

3. 拓扑排序（topological sort) 准备模板

    1. 决定nodes先后顺序(关系) (210. Course Schedule II， 269. Alien Dictionary)

4. 判断有向图是否有cycle (207. Course Schedule)

5. 判断无向图是否有cycle (1192. Critical Connections in a Network)

6. 图二分染色 (785. Is Graph Bipartite?)

7. 最短 (最长) 路径

    1. 经典BFS题 994. Rotting Oranges, 909. Snakes and Ladders, 1091. Shortest Path in Binary Matrix, 1293. Shortest Path in a Grid with Obstacles Elimination
    2. Dijkstra（用heap 写，准备模板）(1631. Path With Minimum Effort， 1066. Campus Bikes II)

8. 并查集Union Find 准备模板. From 1point 3acres bbs

    1. 用于快速合并图的不同components (305. Number of Islands II)
    2. 用于快速判断两个nodes是不是连通

9. 回溯法 Backtracking 本质就是想象成图，然后递归的DFS（有时可以剪枝）526. Beautiful Arrangement, 22. Generate Parentheses

10. Binary search+BFS： 用binary search 查找答案，然后在限制条件下做BFS。类似的用binary search 查找答案的思路见 "7. 搜索和查询 中的binary search部分"

    1. 1102 Path With Maximum Minimum Value
    2. 778 Swim in Rising Water

3. 1631 Path With Minimum Effort. 1point3acres

树 Tree

1. 树的遍历
   1. DFS (binary tree: in-order, pre-order, post-order)
   2. BFS: 314. Binary Tree Vertical Order Traversal，199. Binary Tree Right Side View
2. 递归大法 (大部分树的题都能递归，大的问题(root)，等于先解决几个子问题（subtree),然后合并)：
   1. 124 Binary Tree Maximum Path Sum，
   2. 366 Find Leaves of Binary Tree
3. Lowest Common Ancestor系列
4. Binary Search Tree 判断和快速查找元素: 98 Validate Binary Search Tree
5. 树的编码和解码
   1. 297 Serialize and Deserialize Binary Tree
   2. 428 Serialize and Deserialize N-ary Tree
6. 把树变成图： 863. All Nodes Distance K in Binary Tree

动态规划 Dynamic Programming

有状态转化方程，可以把大问题转化为几个小问题，或者可以按某种顺序依次解决问题. (用图的思想，data 是 node, operation 是 edge) 常见思路有:

- 用 `dp[i]` 代表关于`arr[0:i]`的subproblem（只到i 或者 从i开始的subproblem)
- 用 `dp[i][j]` 代表关于 `arr[i:j+1]` 的subproblem (或者是关于两个数组的 `arr[0:i]` 和 `arr2[0:j]` 的 subproblem,或者关于两个变量 `i, j` 的 subproblem)

经典DP题目

- LIS: 300. Longest Increasing Subsequence O(nlogn) (2D version: 354. Russian Doll Envelopes)
- LCS: 1143. Longest Common Subsequence
- Longest Substring Without Repeating Characters
- 字符串操作： 72. Edit Distance， 44. Wildcard Matching, 10. Regular Expression Matching
- Palindrome problems: 647. Palindromic Substrings, 5. Longest Palindromic Substring
- Prefix sum/max/min 相关： 42. Trapping Rain Water, 1423. Maximum Points You Can Obtain from Cards， Range Sum Query - Immutable, 304. Range Sum Query 2D - Immutable

- Word Break 系列
- 硬币零钱系列 Coin Change
- 买股票系列 Best Time to Buy and Sell Stock
- 跳跃游戏系列 Jump games
- 抢劫系列 House Robber
- 石头游戏系列（Alice & Bob) Stone Game
- Unique Paths 系列
- 688 Knight Probability in Chessboard
- 摘樱桃 Pick cherry
- 174 Dungeon Game
- 1277 Count Square Submatrices with All Ones
- 加油站问题 871. Minimum Number of Refueling Stops

堆 Heap, 栈 Stack, 队 Queue

栈 Stack

- 常规题

    - 946 Validate Stack Sequences
    - Asteroid Collision
- 括号题

    - Valid Parentheses, Remove Invalid Parentheses
    - Basic Calculator 系列
    - Nested List Iterator 系列
    - Decode String， Number of Atoms
- 单调栈

    - Next Greater Element 系列
    - 402 Remove K Digits
    - 853 Car Fleet
    - 739 Daily Temperatures
- 堆 Heap

    - Top k： 215. Kth Largest Element in an Array， 347. Top K Frequent Elements
    - 中位数： double heap 295. Find Median from Data Stream

        - 另外一道经典中位数题目 4. Median of Two Sorted Arrays
    - 会议室问题 253. Meeting Rooms II

  ◦ CPU分配 模板: LC 1834. Single-Threaded CPU, LC 1882. Process Tasks Using Servers

队列 Queue, Deque

- BFS related
- 239 Sliding Window Maximum -> 2D sliding window maximum (转化成两次1D的问题)
- Moving Average from Data Stream

链表 LinkedList

- Fast and Slow pointer (detect cycle, get middle, get kth element)

    ◦ 141 Linked List Cycle
    ◦ 19 Remove Nth Node From End of List
- Reverse Linked List (trick: dummy head) 206 Reverse Linked List, 25 Reverse Nodes in k-Group

- LRU cache

- Deep copy (138 Copy List with Random Pointer)

- Merge LinkedList (2. Add Two Numbers)

排序 Sort

- Merge sort

    ◦ 非常规高频题 315 Count of Smaller Numbers After Self -> (google题： 一堆点, 对每个点 (x, y) 计算 $(x, y) < (u, v)$ 的个数. 思路：先排序，x增序，y减序，然后把y单独拿出来看，对每个点数右边有多少大的元素，变成问题315 with bigger numbers after self)
- Quick Sort / QuickSelect ($O(n)$ time on average) 973. K Closest Points to Origin

- Bucket Sort. $O(n)$. 通常是整体数据量可能很大，但是unique元素有限

- Cycle Sort. $O(n)$ 通常是用于把0到n-1在array中排序（不断交换的想法）

- Python built-in sort

    ◦ OrderedDict (linked list + hash) -> 自己实现： 用 hashtable 存double linkedlist 的 node
    ◦ sorted containers (sorted list, sorted dict, sorted set)

搜索和查询 Search and Query

- hash (python: dictionary, set)

- binary search 左开右闭模板

  - data是有顺序的，每次可以缩小搜索范围. 经典题:

    - 33 Search in Rotated Sorted Array，
    - 153 Find Minimum in Rotated Sorted Array，
    - 162 Find Peak Element

  - 解的范围是一个区间可以二分搜索

    - Binary search + greedy: 1231 Divide Chocolate, 1011 Capacity To Ship Packages Within D Days, 410. Split Array Largest Sum
    - 378 Kth Smallest Element in a Sorted Matrix

  - 经典题 Search a 2D Matrix 系列

  - 字典树 Trie 模板 (单词相关的查找)： 642. Design Search Autocomplete System， 472. Concatenated Words， 212. Word Search II

  - Range Query (Segment Tree 模板) 307. Range Sum Query - Mutable

数组和字符串相关 （array & string)

1. 括号相关题 (另外见【栈】) 921. Minimum Add to Make Parentheses Valid， 1249. Minimum Remove to Make Valid Parentheses

2. 排列 (组合) Permutation

3. 区间题 Intervals `[left, right, val]`

   1. 按左右端点排序的思想 252. Meeting Rooms
   2. 插入，合并，删除区间: 56. Merge Intervals， 57. Insert Interval， 1272. Remove Interval， 435. Non-overlapping Intervals
   3. 安排会议/任务 253. Meeting Rooms II， 1235 Maximum Profit in Job Scheduling， 2054 Two Best Non-Overlapping Events
   4. 区间更新 1094. Car Pooling

4. 常规双指针

   1. 15 3Sum，
   2. 75 Sort Colors（Dutch national flag problem 经典题
   3. 1229 Meeting Scheduler，

4. 680 Valid Palindrome II，
5. 408 Valid Word Abbreviation

5. 滑动窗口 Sliding window 模板

   1. 3 Longest Substring Without Repeating Characters
   2. 76 Minimum Window Substring
   3. 1004 Max Consecutive Ones III
   4. 209 Minimum Size Subarray Sum
   5. 1438 Longest Continuous Subarray With Absolute Diff Less Than or Equal to Limit

6. Subsequence

   1. Greedy drop idea: 392 Is Subsequence， 792 Number of Matching Subsequences
   2. 经典题 727. Minimum Window Subsequence
   3. 940 Distinct Subsequences II

7. Subarray/substring（连续的）

   1. Rolling hash （Rabin-Karp）1062. Longest Repeating Substring， 1044. Longest Duplicate Substring

8. 排列组合

   1. 46 Permutations, 31. Next Permutation
   2. 77 Combinations

9. Subset

   1. 78 Subsets
   2. 368 Largest Divisible Subset

10. 数据流相关的问题

    1. top k 问题 -> heap; buck sort -> distributed system:
    2. 1146 Snapshot Array（打 version tag + binary search）
    3. 359 Logger Rate Limiter
    4. LRU, LFU
    5. Median 295. Find Median from Data Stream
    6. Iterator 284. Peeking Iterator, 900. RLE Iterator

11. Bitmask 用 bit 来表示状态 847. Shortest Path Visiting All Nodes