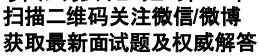


数据结构(上)

课程不允许录像, 否则将追究法律责任, 赔偿损失

九章算法强化班 第2章





微信: ninechapter

微博: http://www.weibo.com/ninechapter

知乎: http://zhuanlan.zhihu.com/jiuzhang

官网: http://www.jiuzhang.com

Overview



数据结构:数据之间的关系,好的关系可以使得数据处理起来更加高效

1. Union Find 并查集

2. Trie 字典树



Union Find

并查集 一种用来解决集合<mark>查询合并</mark>的数据结构 支持O(1)find/O(1)union

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并查集的操作



1. 查询 Find(递归? 非递归?)

O(1) find

1. 合并 Union O(1) union

两个操作时间复杂度证明:

https://en.wikipedia.org/wiki/Proof_of_O(log*n)_time_complexity_of_union%E2%80%93find

Log*n 的解释: https://en.wikipedia.org/wiki/Iterated_logarithm



• 模板代码

```
1- int find(int x) {
2-    if (father[x] == x) {
3       return x;
4    }
5    return father[x] = find(father[x]);
6    }

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```

比较有无路径压缩的区别

路径压缩: O(1) 找root的原因

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合并 Union



- Key
 - 老大哥之间合并
 - 跟小弟没关系

```
1 - public void union(int a, int b) {
2    int root_a = find(a);
3    int root_b = find(b);
4 -   if (root_a != root_b) {
5        father[root_a] = root_b;
6    }
7 }
```



并查集完整模板



```
1 - public class UnionFind{
 2
        private int[] father = null;
 3 -
        public int find(int x) {
            if (father[x] == x) {
 5
                return x;
 6
            return find(father[x]);
 8
9
10 -
        public void union(int a, int b) {
11
            int root_a = find(a);
12
            int root_b = find(b);
13
            if (root_a != root_b)
                father[root_a] = root_b;
14
15
16
```

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Connecting Graph

http://www.lintcode.com/en/problem/connecting-graph/ http://www.jiuzhang.com/solutions/connecting-graph/ 589

题意概括:n个节点的图,没有任何边存在。

有两个操作:

1.在a和b节点之间连上边

2.询问a和b节点是否连通



590

Connecting Graph II

http://www.lintcode.com/en/problem/connecting-graph-ii/http://www.jiuzhang.com/solutions/connecting-graph-ii/

题意概括:n个节点的图,没有任何边存在。

有两个操作:

1.在a和b节点之间连上边 2.询问a所在的连通块的节点个数



45分钟

Connecting Graph III

591

http://www.lintcode.com/en/problem/connecting-graph-iii/ http://www.jiuzhang.com/solutions/connecting-graph-iii/

题意概括:n个节点的图,没有任何边存在。

有两个操作:

1.在a和b节点之间连上边

2.询问当前图的连通块的个数

Connecting Graph问题的总结



- 并查集原生操作:
 - •查询两个元素是否在同一个集合内
 - •合并两个元素所在的集合
- 并查集的派生操作:
 - •查询某个元素所在集合的元素个数
 - •查询当前集合的个数



并查集实战例题

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Google Interviewer: Number of Islands (九章算法班讲过)

434

www.lintcode.com/zh-cn/problem/number-of-islands

http://www.jiuzhang.com/solutions/number-of-islands/



Google Interviewer: Number of Islands II

http://www.lintcode.com/zh-cn/problem/number-of-islands-ii/

http://www.jiuzhang.com/solutions/number-of-islands-ii/



Facebook Interviewer: Graph Valid Tree

http://www.lintcode.com/problem/graph-valid-tree
http://www.jiuzhang.com/solutions/graph-valid-tree/

Union Find O(n)



Surrounded Regions

http://www.lintcode.com/en/problem/surrounded-regions/

http://www.jiuzhang.com/solutions/surrounded-regions/



01:12:55

Trie Tree

字典树

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Snapchat Interviewer: Implement Trie

http://www.lintcode.com/en/problem/implement-trie/
http://www.jiuzhang.com/solutions/trie/



Snapchat Interviewer: Add and Search Word

http://www.lintcode.com/en/problem/add-and-search-word/
http://www.jiuzhang.com/solutions/add-and-search-word/

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Microsoft Interviwer: Word Search II

http://www.lintcode.com/en/problem/word-search-ii/

http://www.jiuzhang.com/solutions/word-search-ii/

- Hash vs Trie做这道题目的区别
 - 把谁建成Trie树?

Word Search II



- Given a dictionary[aca, acc] and a matrix of upper alphabets, find all words in the dictionary that can be found in the matrix.
 - acaf
 - acad
 - acae
- 解题思路:
 - •把字典建成Trie树。
 - •用dfs的方法遍历矩阵,同时在Trie上搜索前缀是否存在。
 - •查询所有Trie里面有可能出现的字符。



Word Square

http://www.jiuzhang.com/solutions/word-squares/

```
对于数组["ball","area","lead","lady"]找到
```

可以组成的所有Word Square

[b a l l]

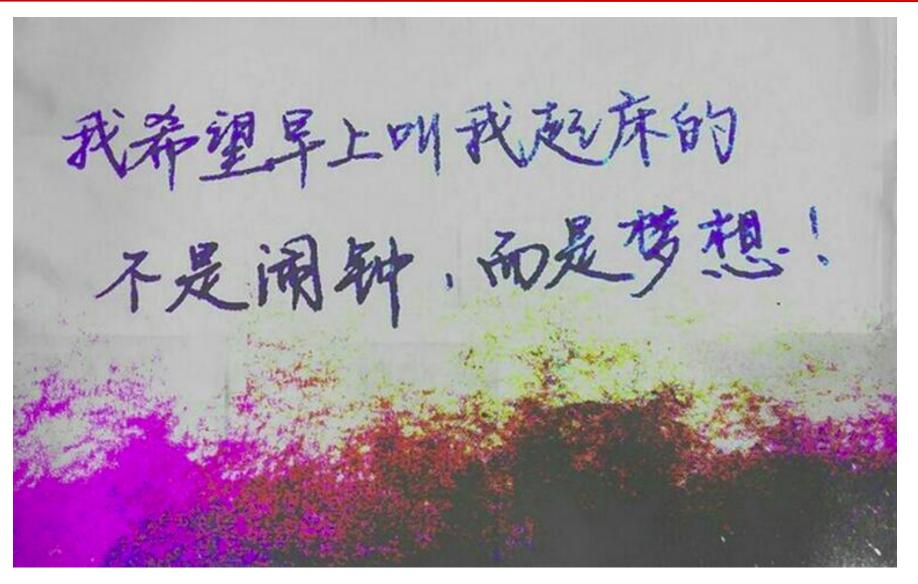
[a r e a]

[lead]

[lady]

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