2021 ICPC Taiwan Online Programming Contest 簡易題解

簡單偏簽到 Olympic Ranking

class Comparable interface String sample code

簡單 Aliquot Sum

N $O(N \log N)$ $O(N\sqrt{N})$ $O(N^2)$

$O(N\sqrt{N})$ d n $\frac{n}{d}$ n $d = \sqrt{n}$ $O(\sqrt{n})$ n

$O(N \log N)$ Sieve of Eratosthenes (https://en.wikipedia.org/wiki/Sieve_of_Eratosthenes) d $2d, 3d, \ldots, kd, \ldots$ $d = 1, \ldots, N$ $(N = 200000)$ $2d, 3d, \ldots, \left\lfloor \frac{N}{d} \right\rfloor d$ Aliquot Sum d Aliquot Sum $O(\sum_{d=1}^{N} \frac{N}{d}) = O(N \sum_{d=1}^{N} \frac{1}{d})$ $\sum_{i=1}^{x} \frac{1}{i} = \ln x + O(1)$ $O(N \log N)$

中偏易 A Sorting Problem

index array BIT merge sort $O(n \log n)$

簡單 Drunk Passenger

Dynamic programming

$\frac{n}{2n-2}$

中偏難 Eatcoin

$f(x) = \sum_{i=1}^{x} i^5 \ f(x)$ f(0)~f(5)

x y

double 64-bit

中偏難 Flip

```
struct Node {
    int tg; // lazytag
    int l, r; // 區間左右界
    long long ans; // 區間內的交替子陣列數量
    int li, ri; // 延伸至左右的交替陣列長度
    int ls, rs; // 最左右的值
}
```

lenL, lenR, Lval, Rval function

```
Node pull(Node l, Node r) {
    s p;
    p.l = l.l;
    p.r = r.r;
    p.ls = l.ls;
    p.rs = r.rs;
    p.tg = 0;
    if (l.rs == r.ls) {
        p.li = l.li;
        p.ri = r.ri;
        p.ans = l.ans + r.ans;
        return p;
    }
    p.ans = l.ans + r.ans + l.ri * r.li;
    p.li = (l.li == (l.r - l.l + 1) ? l.li + r.li : l.li);
    p.ri = (r.ri == (r.r - r.l + 1) ? r.ri + l.ri : r.ri);
    return p;
}
```

中偏難 Garden Park

DP path

DP 1

(x, y)

- DP[x] += DP[y] (y -> x)
- DP[y] += DP[x] (x -> y)

DP

code

```
#define F first
#define S second
map<int,ll>ans; // DP 陣列
map<int,vector<pair<int,int>>>mp;  //index : 邊權值, value : 該權值所有邊的兩端點
for (auto &i : mp) {
    map<int,ll>chg; // 本次更動的 DP 值
    for (auto &j : i.S) {
        if (chg.count(j.F)) {
            chg[j.F]++;
        }
        else {
            chg[j.F] = ans[j.F] + 1;
        }
        chg[j.F] += ans[j.S];
        if (chg.count(j.S)) {
            chg[j.S]++;
        }
        else {
            chg[j.S] = ans[j.S] + 1;
        }
        chg[j.S] += ans[j.F];
    }
    for (auto &i : chg) {
        ans[i.F] = i.S;
    }
}
```

難題 A Hard Problem

- , bit , bit
  , , ,
  - min cut , flow
- ,
  - ,
    - cut ,
  - u v , u v , u v ,
    - cut ,
- q , flow ,
  cut ,
  $O(2^q \times FLOW(16 \times |V|, 16 \times |E|))$

難題 ICPC Kingdom

Matroid Intersection

+ set S_A
set S_B
S G
u v
v u->v
u_2 v_2
u_2 v_2 v_2->u_2
S_A S_B S G
S G G S
S G S G size +1 S size-1

n-1 n-1
$n * \sum x \; O(nm^2)$
$O(nm)$
$O(n * m)$ $O(m)$ bellman-ford$O(nm^2)$

$O(n^2m^2)$ n m AC TLE

簽到題 - JavaScript

NaN