

对顶堆

人员

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上周作业检查

上周作业链接: <https://cppoj.kids123code.com/contest/2685>

The screenshot shows a competition results page with a navigation bar at the top. The main content is a table titled "王向东老师周日一点半C++差分约束". The table has columns for rank (#), username, name, programming score, time, and four problems (A, B, C, D). The data is as follows:

#	用户名	姓名	编程分	时间	A	B	C	D
1	wangchengzhou	王承周	320	8560	100	100	100	20
2	xuruiqian	许睿谦	300	2104	100	100	100	
3	wangyibo	王毅博	300	4152	100	100	100	
4	ruanwenzhang	阮文璋	200	166	100	100		
5	chujinxuan	褚锦轩	200	645	100	100		

本周作业

<https://cppoj.kids123code.com/contest/2902> (课上讲了 A ~ C 题, 课后作业是 C 题)

课堂表现

今天的题目整体难度不是很大, 同学们课上做题表现都比较好。

课堂内容

Grid Filling (上周作业)

$p[i][j][k]$: $(1,1) \sim (i,j)$ 中, 有多少个 k

```
#include <bits/stdc++.h>

using namespace std;

const int maxn = 300 + 5;
int w[maxn][maxn], p[maxn][maxn][maxn], f[maxn];

int get_sum(int x1, int y1, int x2, int y2, int c) {
    return p[x2][y2][c] - p[x1-1][y2][c] - p[x2][y1-1][c] + p[x1-1][y1-1][c];
}

int main()
{
    int n, m, N, hh, ww; cin >> n >> m >> N >> hh >> ww;
```

```

for (int i = 1; i <= n; ++i) {
    for (int j = 1; j <= m; ++j) {
        cin >> w[i][j], f[w[i][j]]++;
        for (int k = 1; k <= N; ++k) {
            p[i][j][k] = p[i-1][j][k] + p[i][j-1][k] - p[i-1][j-1][k] + (w[i][j]==k);
        }
    }
}

int res = 0;
for (int i = 1; i <= N; ++i) {
    if (f[i]) ++res;
}

for (int i = 1, i2 = hh; i2 <= n; ++i, ++i2) {
    for (int j = 1, j2 = ww; j2 <= m; ++j, ++j2) {
        int cnt = 0;
        for (int k = 1; k <= N; ++k) {
            if (get_sum(i,j,i2,j2,k)==f[k] && f[k]) ++cnt;
        }
        cout << res - cnt << " ";
    }
    cout << endl;
}
return 0;
}

```

中位数

对顶堆, 用两个 优先队列 维护

```

#include <bits/stdc++.h>

using namespace std;

int main()
{
    priority_queue<int,vector<int>,less<int>> q1;
    priority_queue<int,vector<int>,greater<int>> q2;

    int n; cin >> n;
    for (int i = 1; i <= n; ++i) {
        int x; cin >> x;
        if (q1.empty() || x<=q1.top()) q1.push(x);
        else q2.push(x);

        while (q1.size() < q2.size()) {
            int u = q2.top(); q2.pop(); q1.push(u);
        }
        while (q2.size()+1 < q1.size()) {
            int u = q1.top(); q1.pop(); q2.push(u);
        }
    }
}

```

```

    }

    if (i&1) cout << q1.top() << endl;
}
return 0;
}

```

Least Elements

两个 multiset 维护, 用类似于对顶堆的思路做即可

```

#include <bits/stdc++.h>
#define int long long

using namespace std;

const int maxn = 2e5 + 5;
int w[maxn];

signed main()
{
    int n, m, K, sum = 0; cin >> n >> m >> K;
    for (int i = 1; i <= n; ++i) cin >> w[i];

    multiset<int> s1, s2;
    for (int i = 1; i <= n; ++i) {
        if (s1.empty() || w[i] < *s1.rbegin()) s1.insert(w[i]), sum += w[i];
        else s2.insert(w[i]);

        if (i >= m) {
            while ((int)s1.size() < K) {
                int u = *s2.begin(); s2.erase(s2.find(u)); s1.insert(u); sum += u;
            }
            while ((int)s1.size() > K) {
                int u = *s1.rbegin(); s1.erase(s1.find(u)); sum -= u; s2.insert(u);
            }
        }

        cout << sum << " ";
    }

    int x = w[i-m+1];
    if (s2.count(x)) s2.erase(s2.find(x));
    else s1.erase(s1.find(x)), sum -= x;
}

return 0;
}

```

Dist Max 2

把所有点按照 x 排序, 维护后缀最大 y 和后缀最小 y

然后二分套二分做即可

```
#include <bits/stdc++.h>

using namespace std;

const int maxn = 2e5 + 5;
struct node {
    int x, y;
    bool operator < (const node& p) const {
        if (x != p.x) return x < p.x;
        return y < p.y;
    }
} w[maxn];
int suf_minY[maxn], suf_maxY[maxn];
int n;

bool check(int mid) {
    for (int i = 1; i <= n; ++i) {
        int pos = lower_bound(w+1, w+n+1, node{w[i].x+mid, (int)-1e9-10}) - w;
        if (pos <= n) {
            int d1 = abs(w[i].y - suf_minY[pos]), d2 = abs(w[i].y - suf_maxY[pos]);
            if (max(d1, d2) >= mid)
                return true;
        }
    }
    return false;
}

int main()
{
    cin >> n;
    for (int i = 1; i <= n; ++i) cin >> w[i].x >> w[i].y;
    sort(w+1, w+n+1);
    suf_minY[n] = suf_maxY[n] = w[n].y;
    for (int i = n-1; i >= 1; --i) {
        suf_minY[i] = min(suf_minY[i+1], w[i].y);
        suf_maxY[i] = max(suf_maxY[i+1], w[i].y);
    }

    int l = 0, r = 1e9;
    while (l <= r) {
        int mid = (l + r) / 2;
        if (check(mid)) l = mid+1;
        else r = mid-1;
    }
    cout << r << endl;
    return 0;
}
```