BCF 2025 Editorial

(Handwritten version)

I. Path of Light



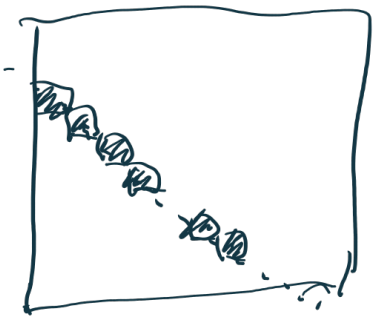
Sort the artifacts from up to down

For each artifact, calculate the effect it makes

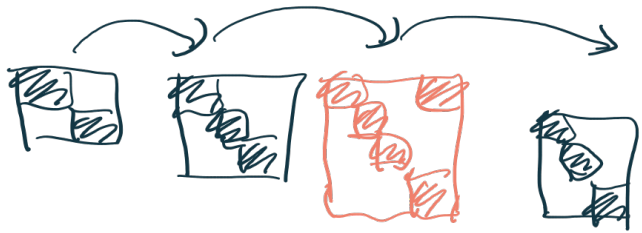
Use std::set to maintain columns with same color

total insert/delete bounded to $O(NMK)$.

II. Village Building



① Fix the r-c value of main drogonal

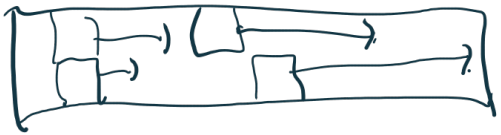


(o) (o) (x)

② Two-pointer method of the upper / lower side row index.

Total Time complexity $O(NM)$

III. The Ritual Square



Sort light location by column index

assign $1 \dots N$ by that sorted order.

If $c_1 \leq c_2 \leq \cdots \leq c_N$

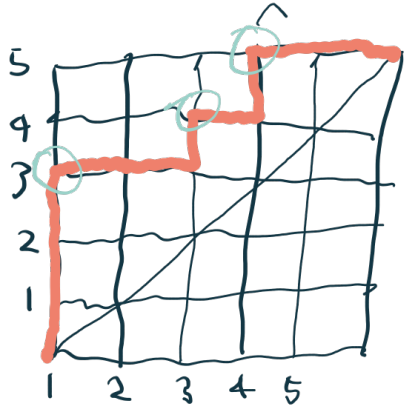
$\Rightarrow c_1 + 1 < c_2 + 2 < \cdots < c_N + N.$

Time: $O(N \log N)$

IV. Stable configuration.

Find permutation of length N where $P_i > P_j > P_k$ ($i<j<k$) does not happen.

ex) 3 1 4 5 2.

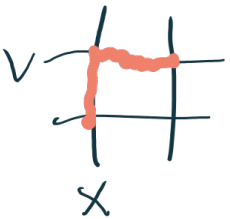


← these entries change prefix max.
other entries are just minimum remaining numbers.

← we can make one-to-one correspondence with grid path.
Total possible number of solutions (without) constraints : catalan number.

IV, cont.

Each constraint $(\max P_1 \cdots P_x = v)$ is a constraint to the path.



It should pass $(x, v-1)$, (x, v), $(x+1, v)$.
Store these constraints in std::set, and calculate the number of ways between adjacent locations in sets.



You might need this subtraction technique.
Time: $O(Q \log N)$

V. Tablet of Record

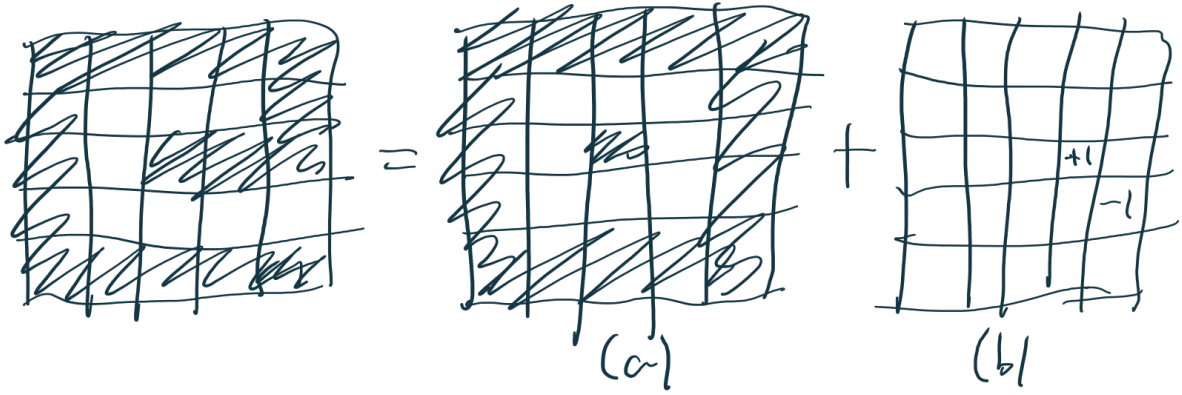
Use greedy approach

→ maximize row $N-1, N-2, \cdots, 1$.

For each row, use DP to get biggest number (< next row's number)

Details omitted. Time complexity $O(9N^2)$.

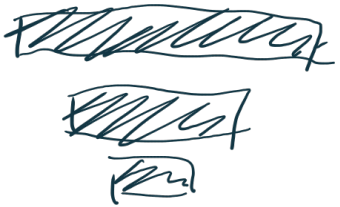
VI. Spiral Pattern.



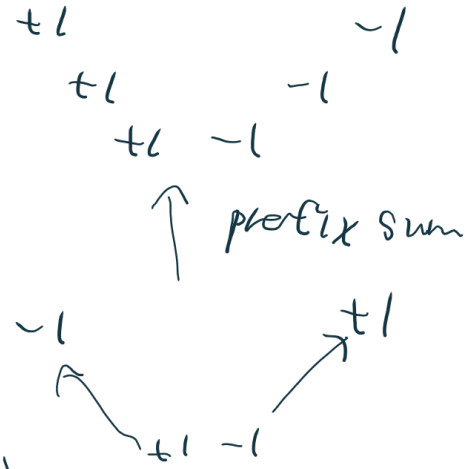
(b): use prefix sum in ↘ direction

VI, cont.

(a): divide it into up/right/left/down.



prefix sum



Time complexity: $O(nm+q)$

III. Coalition of Power

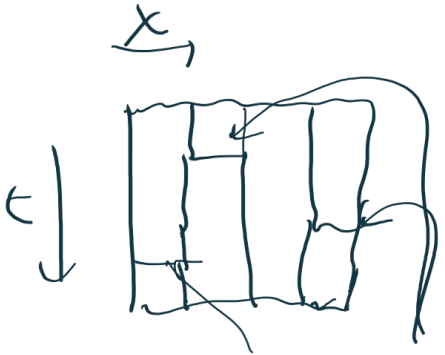
Consider $S_i = \sum_{1 \le j \le i} A_i$.

Max range sum including x

$$= \underbrace{\max_{i \ge x} S_i}_{(a)} - \underbrace{\min_{i < x} S_i}_{(b)}$$

Calculating (a), (b) are symmetric.

Let's look at (a) only.

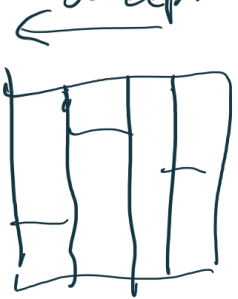


Si values are only changed Q times in total.

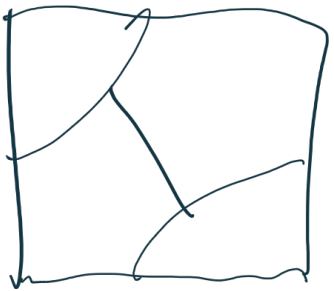
Use Beats + History.

Sweep in x axis and update by N+Q intervals of same Si value.

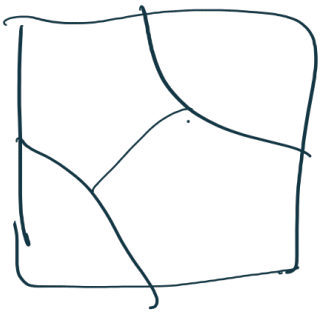
→ $O((N+m+Q)\log(N+m))$



VIII. Crosslink



or

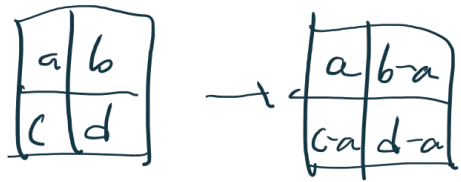


Use Dial algorithm to calculate min dist.

$O(NM + 36(N+M))$

IX. Harmonious Square.

Use difference to detect harm... square.

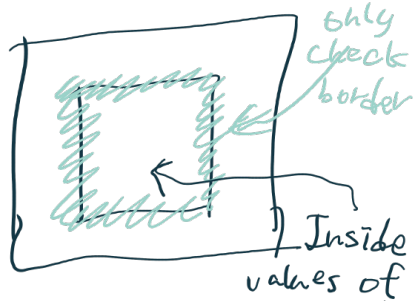


$\{a, b, c, d\} = \{1, 2, 3, 4\}$

$\{b-a, c-a, d-a\} = \{1, 2, 3\}$

You only need to check the border of update rectangle.

$O((N+M)Q)$.



To speed up constant factor, use bitmasks (mes runs in 140ms).

X. Lost Island

If M even: All values should occur even number of times

If M odd: Number of values occuring odd number of times $\leq N$.

1. Timeweaver.

Base grid

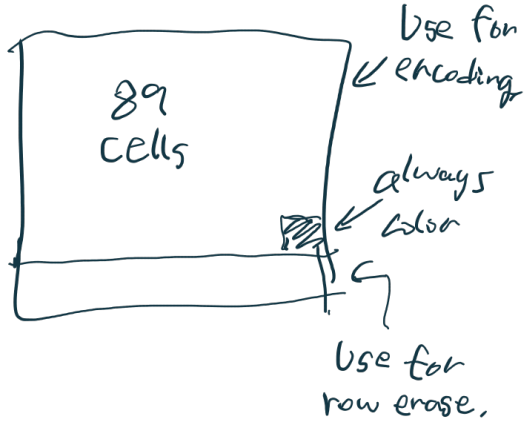
1 0 1 0 1 0 1 0 1 0

1 0 1 0 1 0 1 0 1 0

⋮

(omitting a lot of details)

Strategy



Color 89 cells, color at least one of two adjacent cells.

→ F_{91} ways. $\sim 1.01 \times 2^{62}$

Last row: (row 1 + row 2 + ⋯ + row 9) mod 89.

By Zeckendorf representation, all cases are uniquely decoded.

2. The Ruins of Light

Hope you had fun!