

CATALYSTS
CODING
CONTEST

A pair of hands is shown from the chest up, holding a glowing, textured sphere that resembles the Earth. The sphere is illuminated from the right, creating a bright glow and casting the hands into soft shadow. The background is a dark, deep blue space filled with numerous small, distant stars and a few larger, faint nebulae. The overall mood is one of cosmic scale and human responsibility.

Level 3

GladOS:

- *I promised you a joke, didn't I?*
- *I've been told I'm great at jokes. 5/7 was my rating, above average!*
- *Oh, the joke, right...*

- *Knock, knock!*
- *Who's there? (... tbc)*

Your next task is to determine where the capital of each country is located.

In order to find the capital you'll need to find the cell located at the **center of mass** of the country. That is the **rounded down** average of all cells belonging to that country, including borders. Altitude does not affect the center.

If that **cell is outside the country or is on the border**, then the capital will be the **closest cell from the center of mass** that is **inside the country's borders**. Distances are **Euclidean**.

If **multiple cells are tied** for being the closest to the center, pick the one with the **lowest row then lowest column**.

It is guaranteed that **all countries have a capital**.

Input

rows cols

a_{00} c_{00} a_{10} c_{10} a_{20} c_{20} ...

a_{01} c_{01} a_{11} c_{11} ...

...

$a_{0rows-1}$ $c_{0rows-1}$ $a_{1rows-1}$ $c_{1rows-1}$... $a_{cols-1rows-1}$

$c_{cols-1rows-1}$

cols - number of columns

rows - number of rows

a_{xy} - altitude of world at col x and row y
(integer)

c_{xy} - country id of cell at col x and row y
(integer)

Same as before!

Output

X_0 Y_0

X_1 Y_1

X_2 Y_3

...

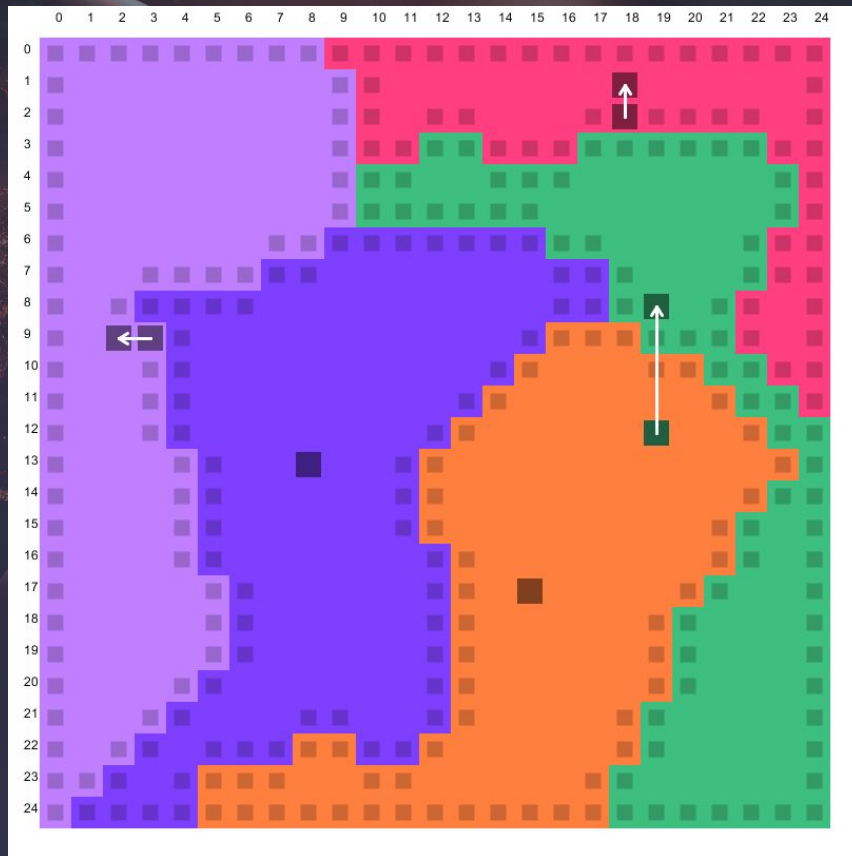
X_{n-1} Y_{n-1}

n - number of countries

X_i - X-coordinate(column) of the capital
of country with id i

Y_i - Y-coordinate(row) of the capital of
country with id i

Capitals that are in
invalid positions are
moved to the closest valid
position.



Example from archive

