CHALLENGE 3 : DSO

ROBOTIC AUTONOMY

For this challenge, we will consider a robot that needs to move from its current position to a goal position across challenging terrain, avoiding obstacles along the way and conserving as much energy as possible.

Download the elevation map of the terrain (Elevation.csv) from the challenge website to get started. The map is on a grid made out of cells with integer coordinates, where the robot can move from each cell (x, y) to any of its 8 neighbours, $(x + a, y + b)$ where $-1 \leq a \leq 1, -1 \leq b \leq 1, |a| + |b| \geq 1$.

The robot starts from (0, 0) . What is the robot's lowest cost to reach the goal position (90, 50)? Round the lowest cost to 1 decimal place.

Within the elevation map:

- The first row gives the x-coordinate scale.
- The first column gives the y-coordinate scale.
- Other values give elevation, in meters.

The energy cost of taking a step is the sum of horizontal cost and climbing cost, where:

- Horizontal cost: $\sqrt{a^2 + b^2}$
- Climbing cost: 10 times the increase in elevation in meters (no climbing cost if going to the same or lower elevation)

Examples:

- Taking a step from (0, 0) which has an elevation of 7.9 to (1, 1) which has an elevation of 8.5 will cost $\sqrt{2}$+6, or roughly 7.41 units.
- Taking a step from (0, 0) which has an elevation of 7.9 to (0, -1) which has an elevation of 7.5 will cost 1 unit.

Answer: 181.7

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