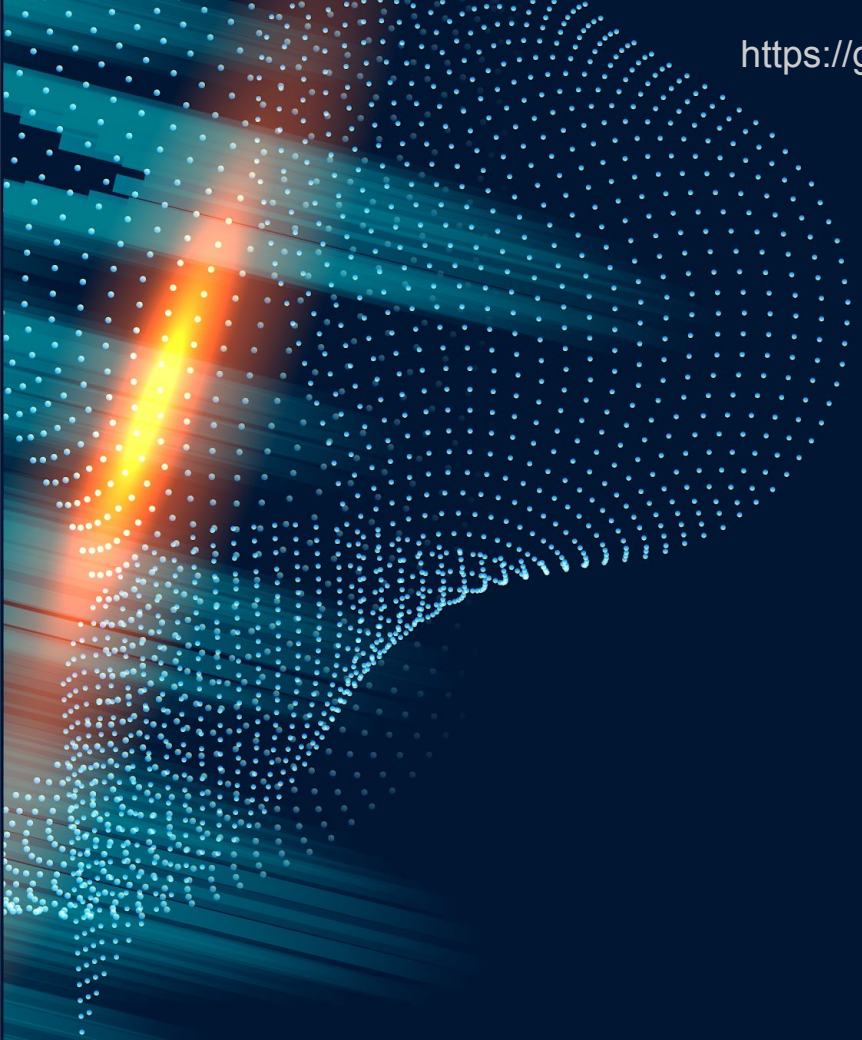
Artificial Intelligence project

Cinvestav Guadalajara

Carlos Cardenas
Emilio Tonix
Julia Abud

https://github.com/Tonix22/MachineLearning_Project/wiki/Homework-II



Part 2

A*
Hill Climbing
Simulated Annealing

TASKS

30 January 2021 - 12 February 2021

- Implement
  - A*
  - HillClimbing
  - Simulated Annealing

Map: CollectMineralShards

Description

A map with 2 Marines and an endless supply of Mineral Shards. Rewards are earned by moving the Marines to collect the Mineral Shards, with optimal collection requiring both Marine units to be split up and moved independently. Whenever all 20 Mineral Shards have been collected, a new set of 20 Mineral Shards are spawned at random locations (at least 2 units away from all Marines).

Initial State

- 2 Marines at random locations (unselected)
- 20 Mineral Shards at random locations (at least 2 units away from all Marines)

Rewards

Marine collects Mineral Shard: +1

End Condition

Time elapsed

Time Limit

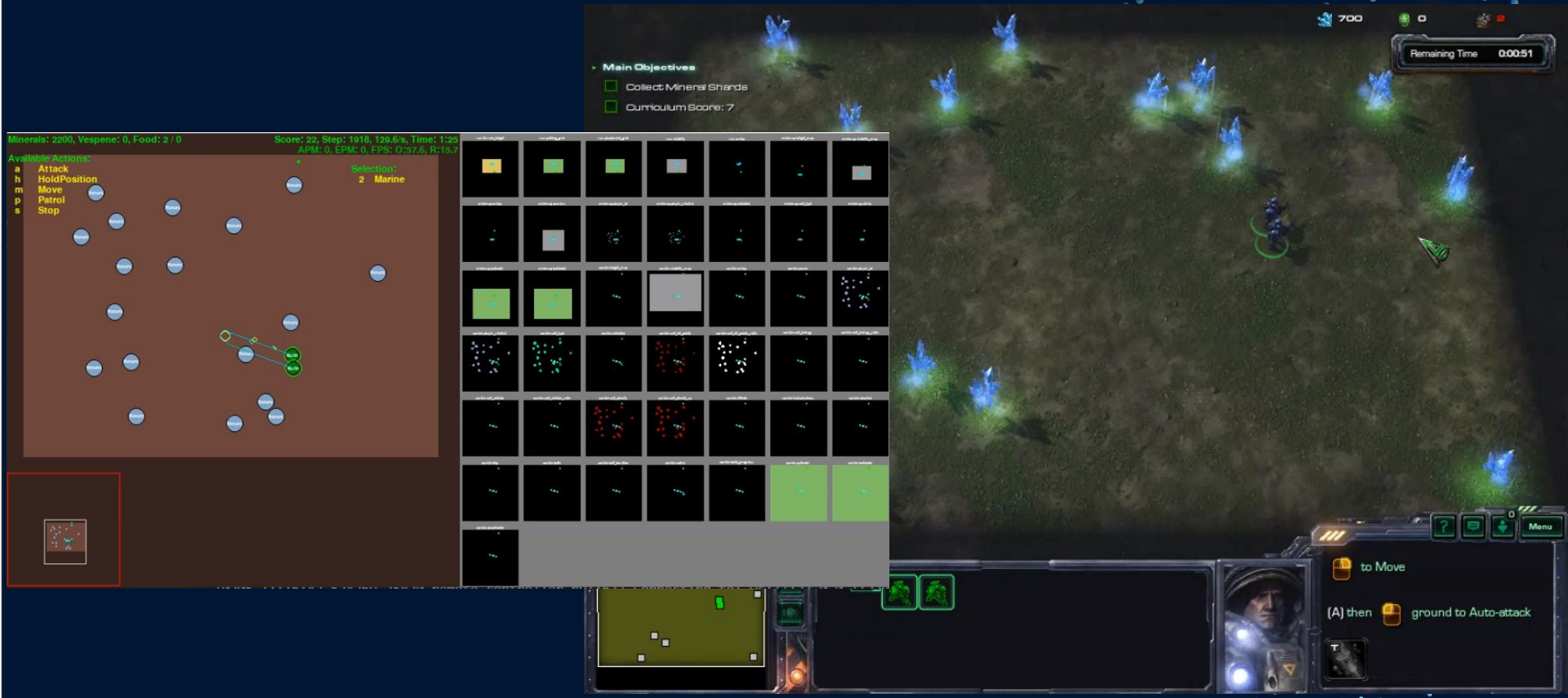
120 seconds

Additional Notes

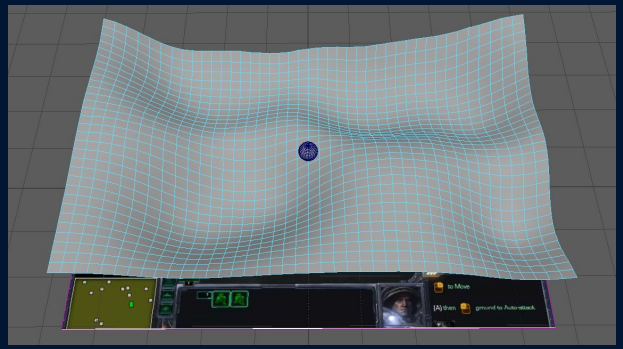
Fog of War disabled

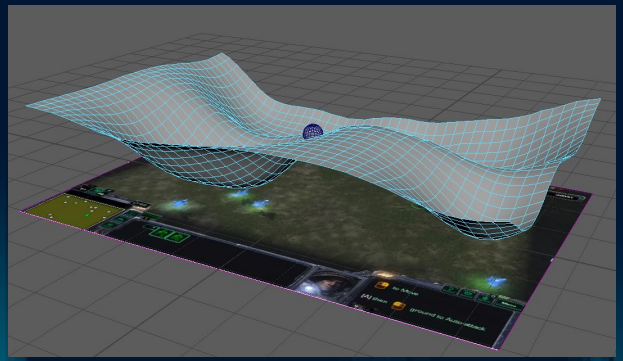
No camera movement required (single-screen)

This is the only map in the set to require the Liberty (Campaign) mod, which is needed for the Mineral Shard unit.


Minerals: 2200, Vespene: 0, Food: 2 / 0
Score: 22, Step: 1918, 129.6/s, Time: 1:25
APM: 0, EPM: 0, FPS: O:57.6, R:15.7
Available Actions:
a Attack
h HoldPosition
m Move
p Patrol
s Stop
Selection:
2 Marine
700
0
Remaining Time 0:00:51
Main Objectives
Collect Mineral Shards
Curriculum Score: 7
Menu
to Move
(A) then ground to Auto-attack

CONCENTRACIÓN DE MINERALES : Heightmap





Brush and Heightmap

Brush:

Generates a squared matrix with a Gaussian distribution

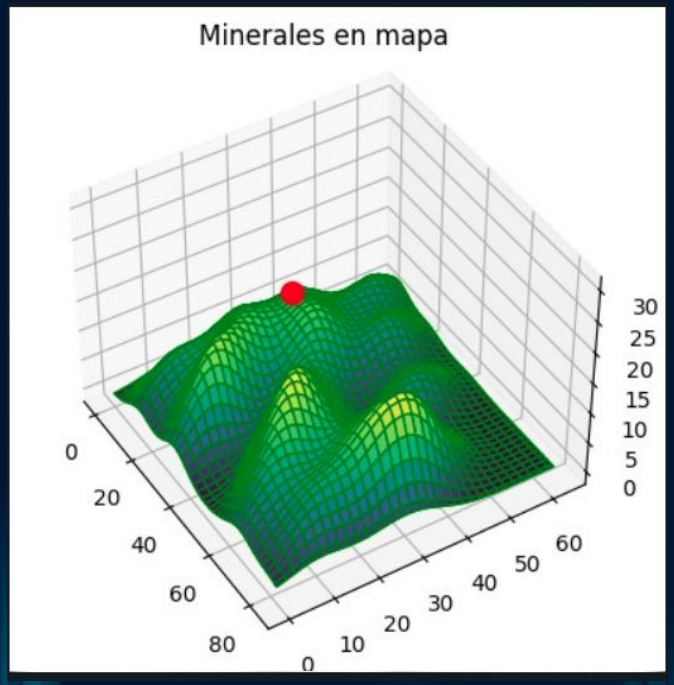
Example:

0.00 **0.03 0.03** 0.00
0.02 0.28 0.28 0.02
0.02 0.28 0.28 0.02
0.00 **0.03 0.03** 0.00

Heightmap:

- Map - Matrix with the size of our game screen (initialized with 0s)
- We can stamp out our brush
  - add the values of our brush over a coord in Map
- If we stamp several times we get our map with concentration points

SIMULATED ANNEALING



When point is stuck in local maxima, we could give a change to jump to explore other location with a simplified boltzmann distribution. Where delta is Energy is height.

$$e^{\frac{\Delta E}{T}} > rand(0,1)$$

Temperature decreases alpha times per cycle

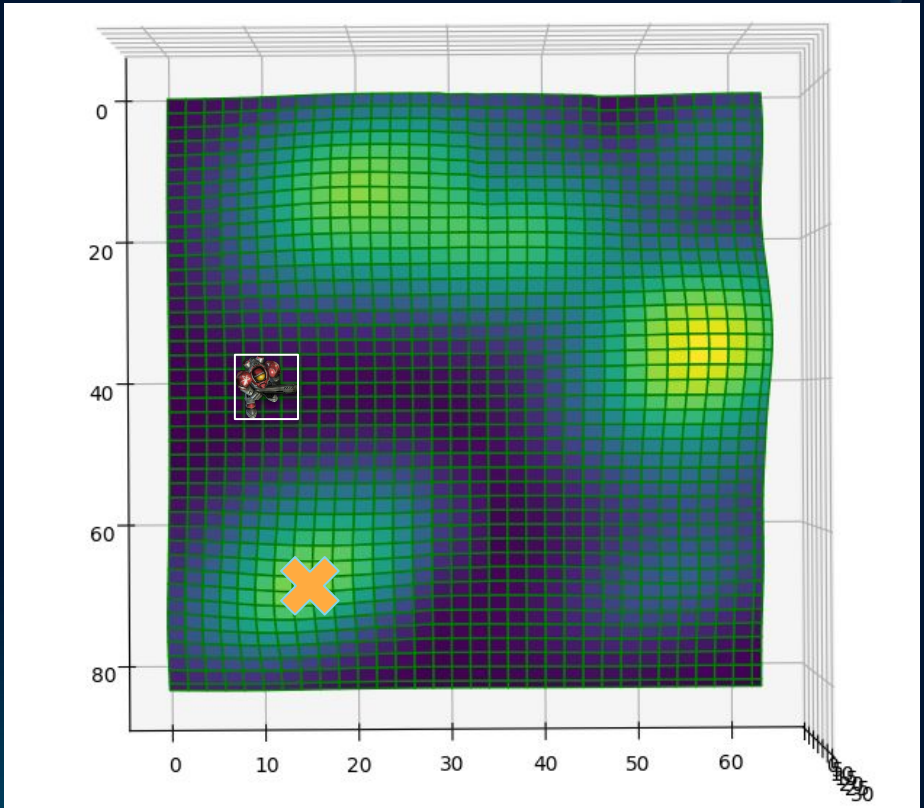
Tuning Alpha

$$T_o * a^n = T_F$$

$$a = e^{\frac{\ln\left(\frac{T_F}{T_0}\right)}{n}}$$

HILL CLIMBING

A*



This version of A* try to find a next first maximum local only using a heuristic based in the value of coordinates of the mesh.

The real problem is that needs a lot of calculus when the map is almost empty.

Because there are a lot of “plain ground” and that make difficult to find the maximum.