

Heuristic Search

13.09.2022

Achilleas Tsakpins

What does „heuristic“ does even mean?

- ❖ “A heuristic [...] or heuristic technique, is any approach to problem solving or self-discovery that **employs a practical method** that is **not guaranteed to be optimal, perfect, or rational**, but is nevertheless **sufficient for reaching an immediate, short-term goal or approximation**. Where finding an **optimal solution is impossible or impractical**, heuristic methods can be used to **speed up the process of finding a satisfactory solution**.” - Wikipedia

Greedy Search

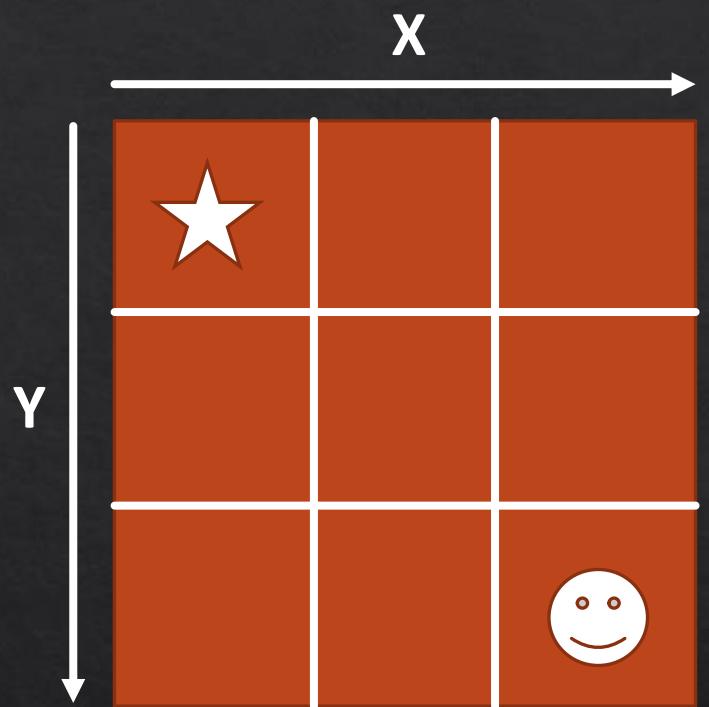
- ❖ “A greedy algorithm is any algorithm that follows the problem-solving heuristic of making the locally optimal choice at each stage. In many problems, a greedy strategy does not produce an optimal solution, but a greedy heuristic can yield locally optimal solutions that approximate a globally optimal solution in a reasonable amount of time.” – Wikipedia
- ❖ Pseudocode:
 1. As long as Priority Queue is not empty
 1. Get first element X of Priority Queue with smallest distance to destination
 2. Check if we arrived at the destination
 1. Yes: Stop
 2. No: add all valid neighbors to the Priority Queue with their distance to the destination
 3. Repeat
 2. Is the current location the destination?
 1. Yes: Reached the end
 2. No: Failed because of unreachable destination

Priority Queue

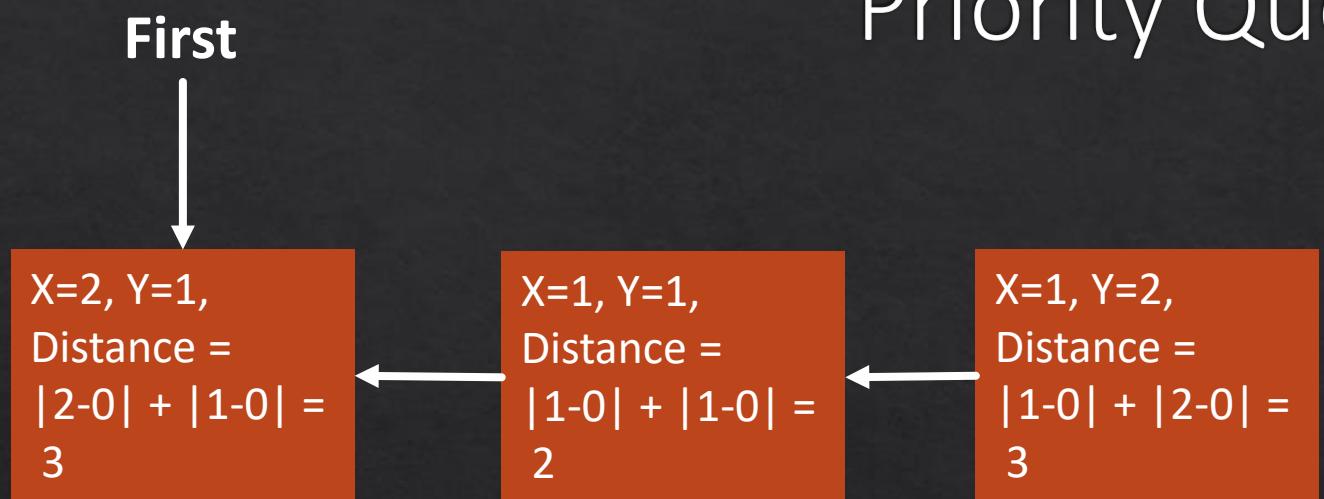
First



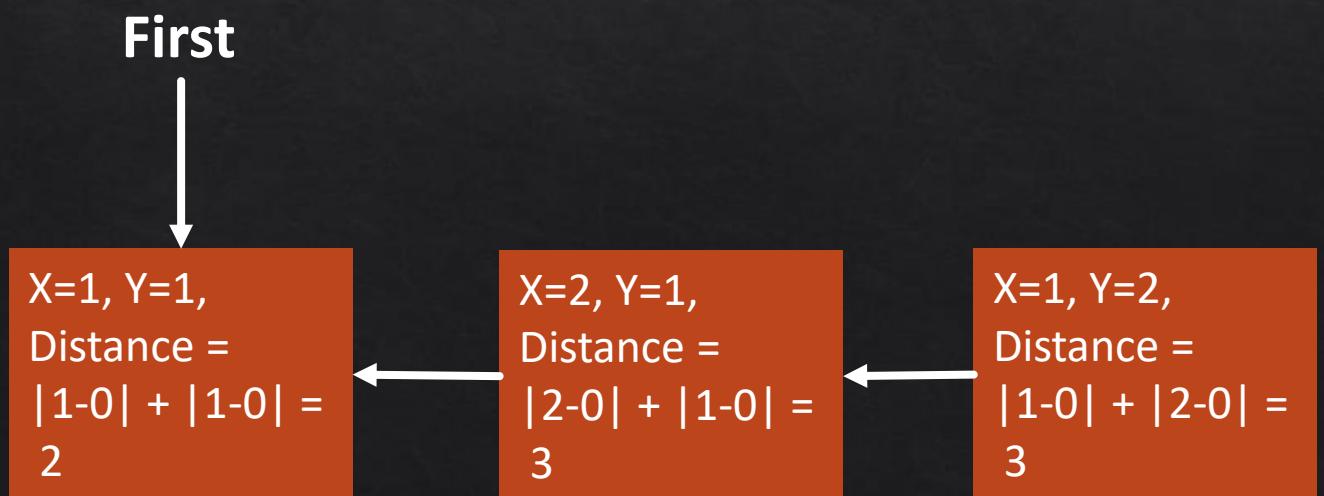
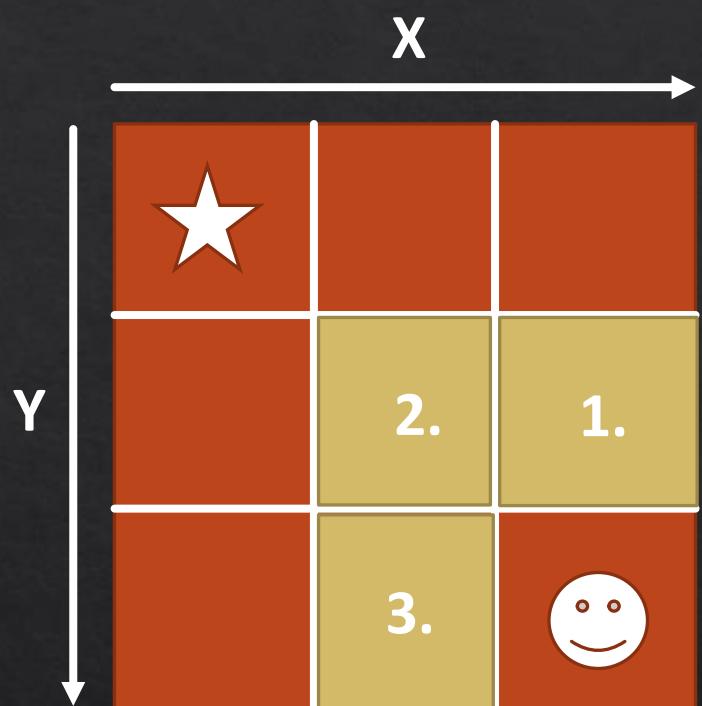
X=2, Y=2,
distance =
 $|2-0| + |2-0| =$
4



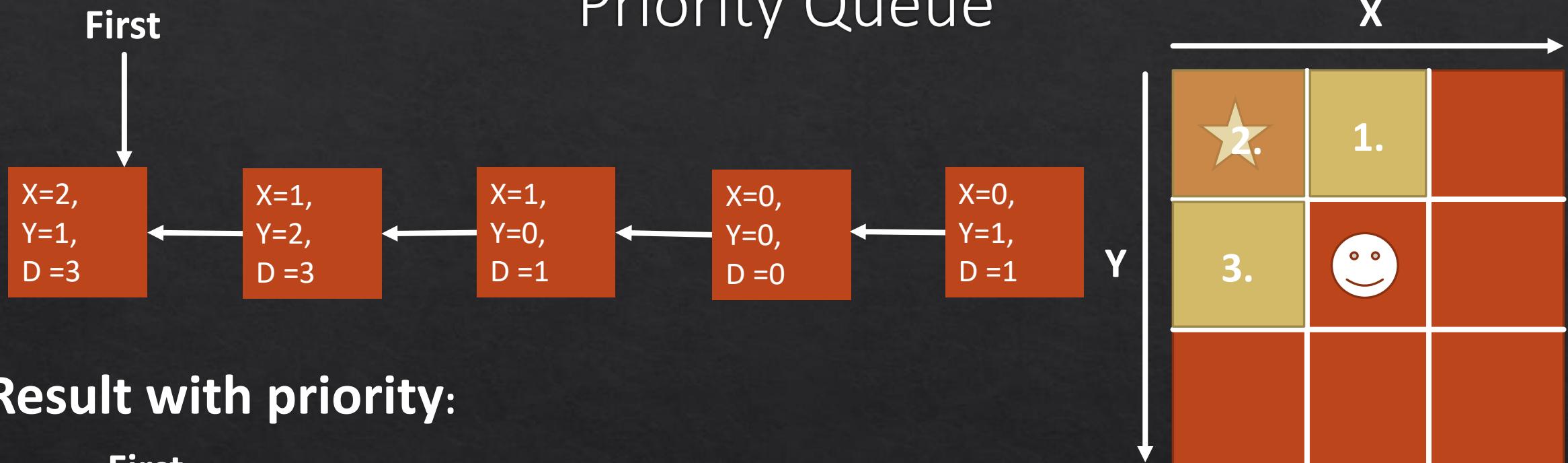
Priority Queue



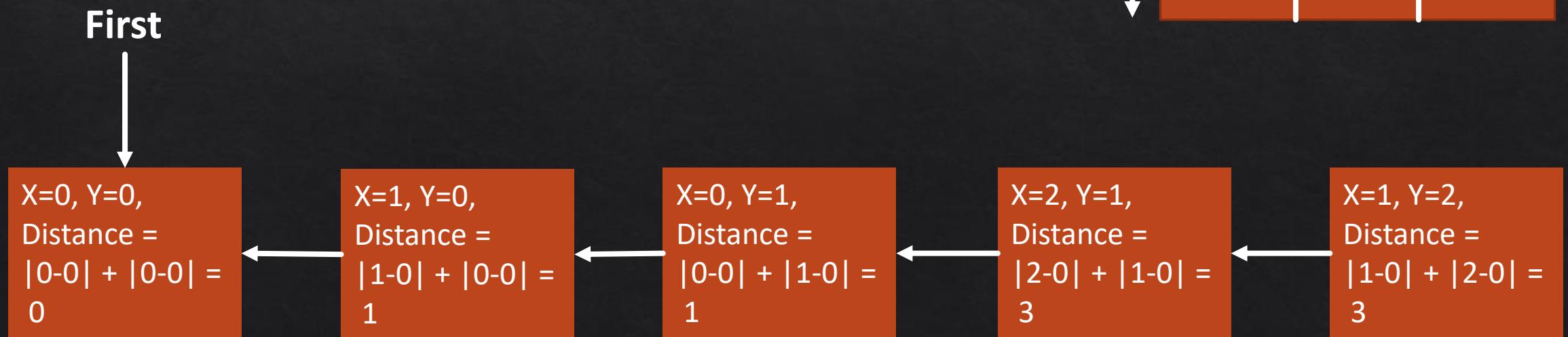
Result with priority:



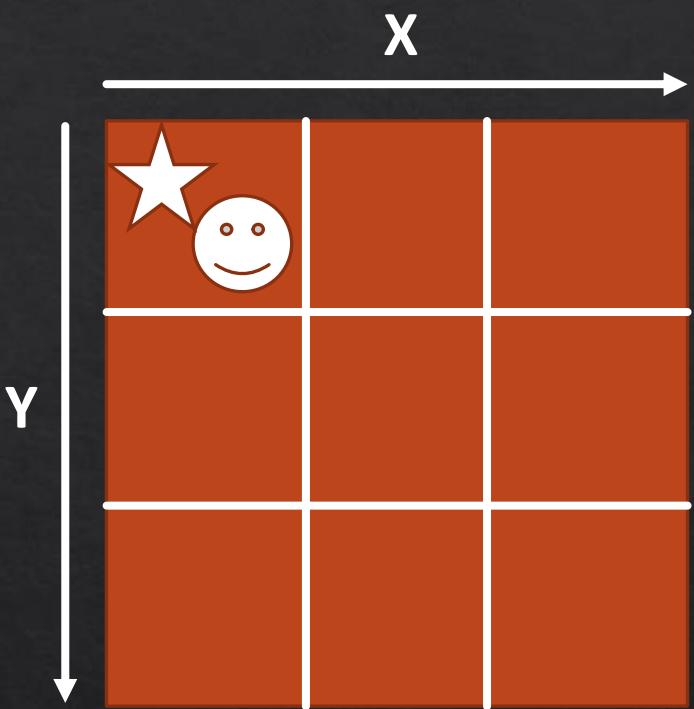
Priority Queue



Result with priority:



Priority Queue



Done



X=1, Y=0,
Distance =
 $|1-0| + |0-0| =$
1

X=0, Y=1,
Distance =
 $|0-0| + |1-0| =$
1

X=2, Y=1,
Distance =
 $|2-0| + |1-0| =$
3

X=2, Y=1,
Distance =
 $|2-0| + |1-0| =$
3