13 Navigation using Potential Fields (Pen & Paper)

Fig. 1 shows a Potential Field for Robot-Navigation. Unfortunately the way between starting position (black circle) and target position (white circle) is blocked by many static obstacles.

- Suggest modifications to the Potential field such that the robot is not stuck in local minima.

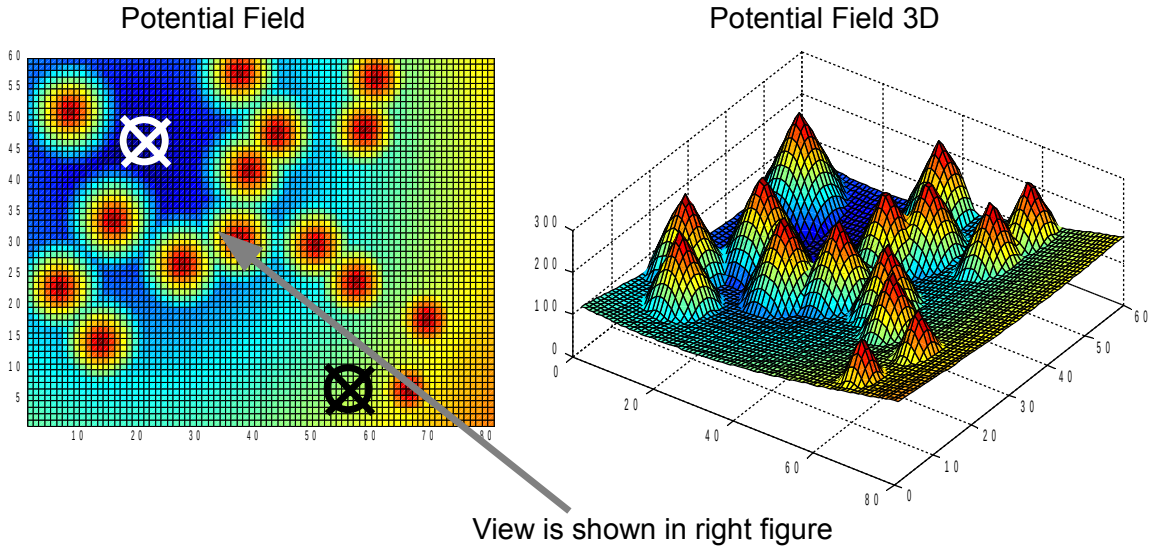

Fig. 1:

14 Creating Q-Tables for Navigation (Pen & Paper)

Fig. 2 shows a Q-Table and the corresponding reward table. Here, a discount factor γ of 1 is used.

- Compute the Q-Values for all actions (Left,Right,Up,Down) in state (col=2,row=2) for one iteration. Assume that the "old" Q-Values for state (2,2) are all zeros.
- After the Q-Values for all states are known, an agent can use the Q-Value-Map to navigate through the states by executing actions. Assuming that the agent starts at state (1,1), in which state is the agent after 5 actions have been executed.

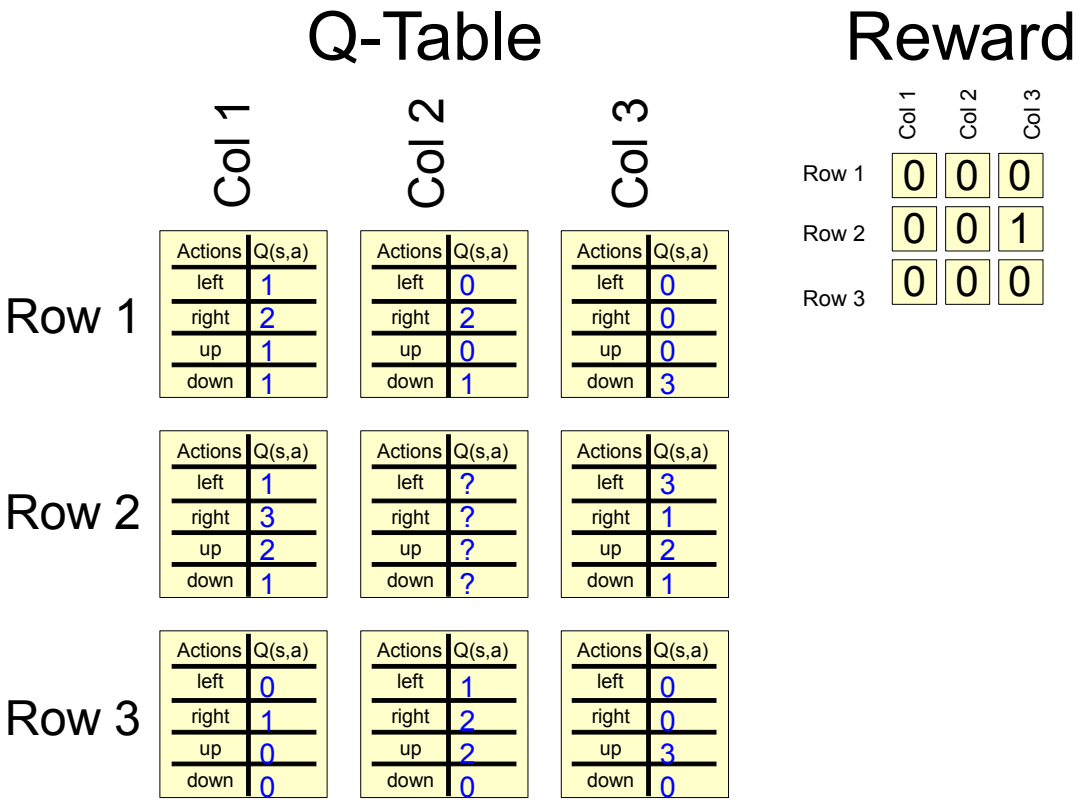

Fig. 2: