Homework №1

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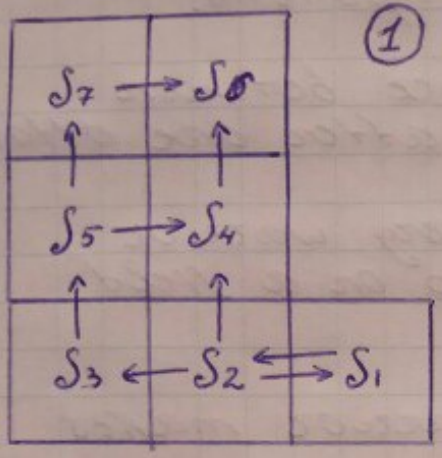
302



① a) $\gamma = 0.8$

$V^*(S_6) = 0$
$V^*(S_7) = V^*(S_4) = 100$
$V^*(S_5) = 80$
$V^*(S_3) = 50 + 80 \cdot 0.8 = 114$
$V^*(S_2) = 0.8 \cdot 114 = 91.2$
$V^*(S_1) = 0.8 \cdot 91.2 = 72.96$

b) Optimal policy when $\gamma = 0.8$:

(S_1, west) (S_2, west) (S_3, north) (S_4, north)
(S_5, north) (S_6, stay) (S_7, east)

c) Yes, it changes:

(S_1, west) (S_2, north) (S_4, north) (S_6, stay)
(S_7, east) (S_5, north) (S_3, north)

d) $Q(S_2, \text{west}) = 91.2$
$Q(S_6, \text{stay}) = 0$
$Q(S_3, \text{north}) = 114$

e) $S_1 \to S_2 \to S_3 \to S_5 \to S_7 \to S_6$

1) $0 \to 0 \to 50 \to 0 \to 100 \to 0$ 1-st episode

2) $0 \to 40 \to 50 \to 80 \to 100 \to 0$ 2-nd episode

3) $32 \to 40 \to 114 \to 80 \to 100 \to 0$ 3-rd episode

② State representation: positions of all bowmen and swordsmen of two armies and their health-points.

Reward function: difference between hit points of the armies after one attack

Action: (1-st option): every warrior of an army makes one step on a field or hits the enemy

(2-nd option): only one warrior makes a step or hits the enemy

I also think that it is a good idea to add weights to the hit points of bowmen and swordsmen, because bowmen can hit enemy from a much longer distance.

But it can be a problem with my solution if armies have a large number of warriors (there will be many states).

And warriors can not only attack and move, but also build defensive fortifications (they can do it during the battle, then another alternative to action is added or they can do it before the battle then the game is reasonably divided into two global states: peacetime and battle).