Theme:

14. The Bellman Equation:

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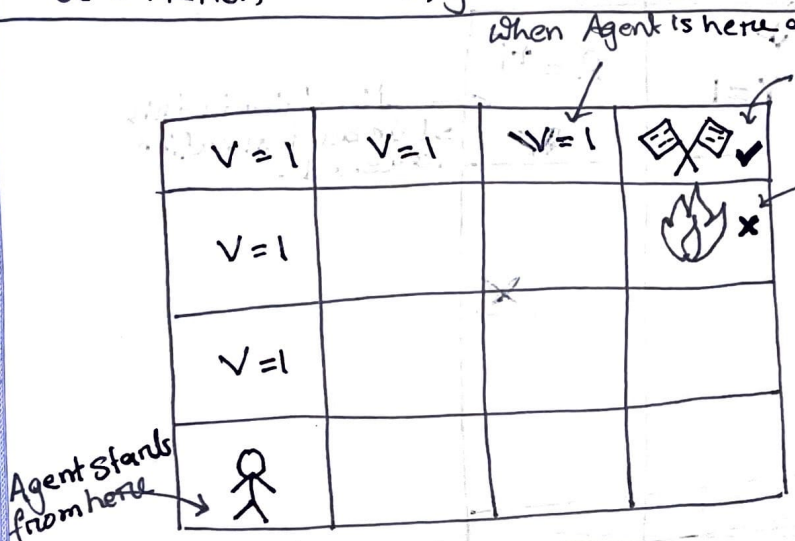
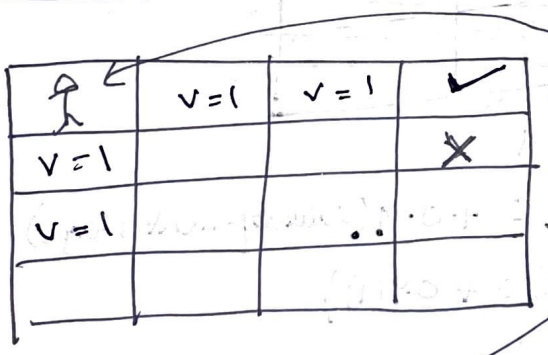
S = State R - Reward

a = Action γ / gamma = Discount factor.





That's when the Bellman equation comes in!

$$V(s) = \max_a (R(s,a) + \gamma V(s'))$$

V = Value of being in a certain state.

s = current state on any given state.

s' = the following state. The state you will end up in after this state.

R = reward

$\max_a$ = maximum value based on an action.

$$V(s) = \max_a (R(s,a) + \gamma V(s'))$$

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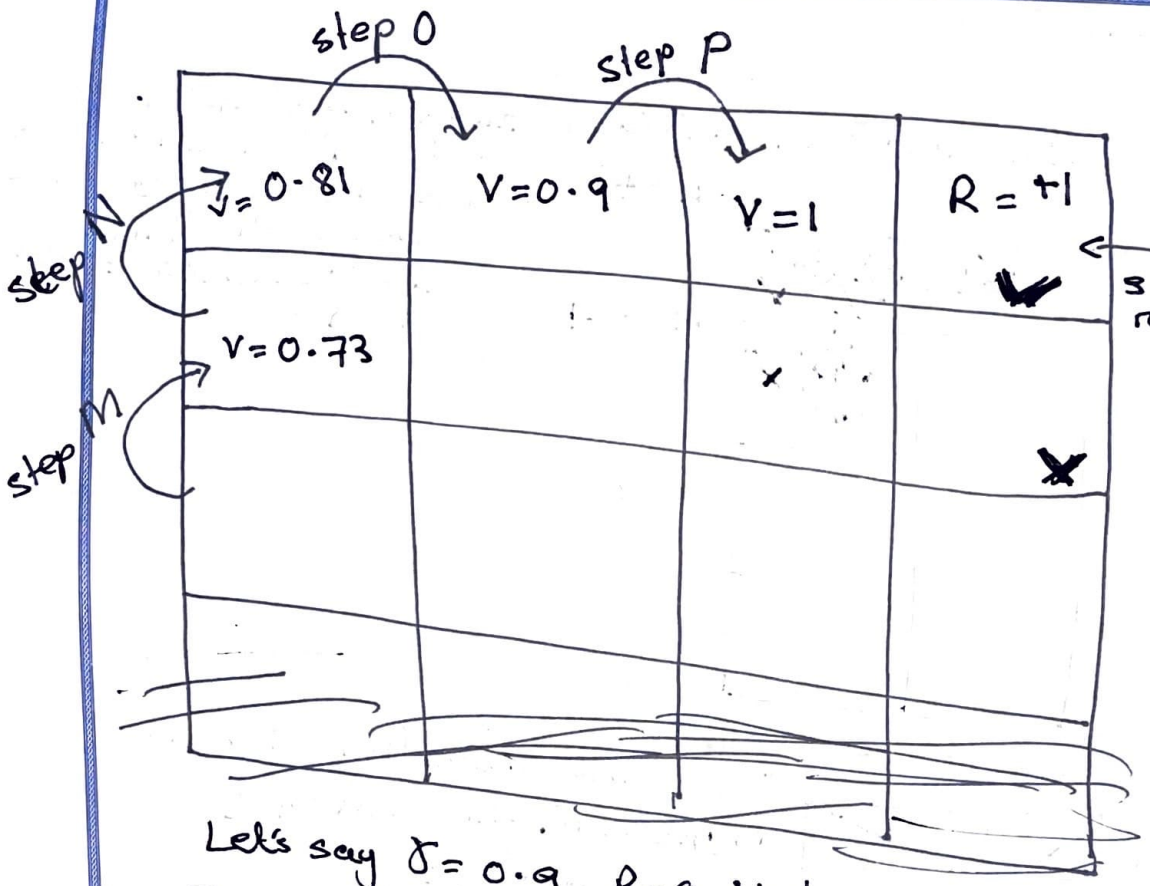

Let's say $\gamma = 0.9$, $R = 0$, $V = 1$

— For step P : $V(s) = \max_a (0 + 0.9(\text{value of next stage})$

$\Rightarrow V(s) = \max_a (0 + 0.9(1))$

$\Rightarrow V(s) = 0.9$

— For step 0 :

$V(s) = \max_a (0 + 0.9(0.9)$

$V(s) = 0.81$

— For step N : $V(s) = (0 + 0.9(0.81)$

$= 0.73$

— For M : $V(s) = (0 + 0.9(0.73)$

$= 0.66$

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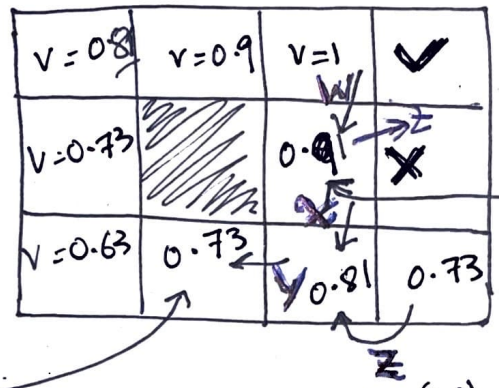
Theme:

(Q) How does the Discount factor work?

(Ans) It discounts the value (V) of the state (s) as you are further away from the goal.



(Q) How do we calculate the value (V) in this box)

(A) We calculate the value of this square first

For W: $V(s) = (0 + 0.9(1) = 0.9$

For X: $V(s) = (0 + 0.9(0.9) = 0.81$

For Y: $V(s) = (0 + 0.9(0.81) = 0.73$

For Z: $V(s) = 0 + 0.9(0.81) = 0.73$