

Homework 2

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Exercise 1

(a) State space: $X = \{1N, 2N, 3N, 1B, 2B, 3B, 4B, D, V\}$

N: states where the pacman can be without the blue pellet

B: States where the pacman can be with the blue pellet

D: defeat state

V: victory state

Action space: $A = \{U, D, L, R\}$

U: up

D: down

L: left

R: right

(b) probability matrix for action "Left"

$$P_L = \begin{matrix} & \begin{matrix} 1N & 2N & 3N & 1B & 2B & 3B & 4B & D & V \end{matrix} \\ \begin{matrix} 1N \\ 2N \\ 3N \\ 1B \\ 2B \\ 3B \\ 4B \\ D \\ V \end{matrix} & \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \end{matrix}$$

cost function:

	U	D	L	R	
C =	1	1	1	1	1N
	1	1	1	1	2N
	1	1	1	1	3N
	1	1	1	1	1B
	1	1	1	1	2B
	1	1	1	1	3B
	1	1	1	1	4B
	0	0	0	0	D
	0	0	0	0	V

$$(c) \quad J^T(n) = \sum_{t=0}^{\infty} C_t \gamma^t = \frac{C}{1-\gamma}$$

$$J^L(1N) = 1 + 0,9 \times 1 + 0,9^2 \times 1 + 0,9^3 \times 1 + \dots = \frac{1}{1-0,9} = 10$$

$$J^L(2N) = 1 + 0,9 \times 1 + 0,9^2 \times 1 + 0,9^3 \times 1 + \dots = \frac{1}{1-0,9} = 10$$

$$J^L(3N) = 1 + 0,9 \times 1 + 0,9^2 \times 1 + 0,9^3 \times 1 + \dots = \frac{1}{1-0,9} = 10$$

$$J^L(1B) = \text{"} = \frac{1}{1-0,9} = 10$$

$$J^L(2B) = \text{"} = \frac{1}{1-0,9} = 10$$

$$J^L(3B) = \text{"} = \frac{1}{1-0,9} = 10$$

$$J^L(4B) = \text{"} = \frac{1}{1-0,9} = 10$$

$$J^L(D) = 0 + 0,9 \times 0 + 0,9^2 \times 0 + 0,9^3 \times 0 + \dots = 0$$

$$J^L(V) = 0 + 0,9 \times 0 + 0,9^2 \times 0 + 0,9^3 \times 0 + \dots = 0$$

J ^L =	10	1N
	10	2N
	10	3N
	10	1B
	10	2B
	10	3B
	10	4B
	0	D
	0	V