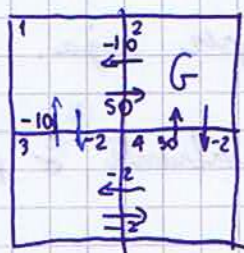


Esercizio Q-Learning



$$\gamma = 0.9$$

R	↑	↓	→	←
1	-	0 -2	50	-
2	-	-2	-	-10
3	-10	-	-2	-
4	50	-	-	-2

Q	↑	↓	→	←
1	0	0 -2	0	0
2	0	0	0	0 -10
3	0	0	0 43	0
4	0 50	0	0	0

$$Q(3, \rightarrow) = -2 + 0.9 \max \{0, 0, 0, 0\} = -2$$

$$Q(4, \uparrow) = 50 + 0.9 \max \{0, 0, 0, 0\} = 50$$

$$Q(2, \leftarrow) = -10 + 0.9 \cdot \max \{0, 0, 0, 0\} = -10$$

...

$$Q(1, \downarrow) = \cancel{-10} + 0.9 \max \{0, 0, -2, 0\} = -2$$

$$Q(3, \rightarrow) = -2 + 0.9 \cdot \max \{50, 0, 0, 0\} = 43$$

ESERCIZIO CORREZIONE STATO

$$z_t = h(s_t, l) = \begin{bmatrix} x_t - x_l \\ y_t - y_l \end{bmatrix}$$

\downarrow \downarrow
 $[x_0, y_0]$ $[x_l, y_l]$

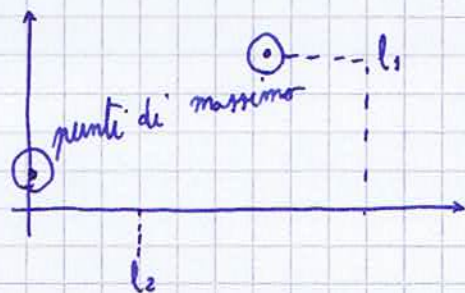
$$\bar{\mu} = \begin{bmatrix} 1.8 \\ 0.7 \end{bmatrix} \quad l_1 = \begin{bmatrix} 2.2 \\ 0.4 \end{bmatrix} \quad l_2 = \begin{bmatrix} 0.5 \\ -0.3 \end{bmatrix} \quad Q = \begin{bmatrix} 0.1 & 0.0 \\ 0.0 & 0.01 \end{bmatrix} \quad \Sigma_t = \begin{bmatrix} 0.5 & 0 \\ 0 & 0.05 \end{bmatrix}$$

1. Definizione criterio di massima verosimiglianza e criterio MAP

$$\hat{x}_{ML} = \underset{x}{\operatorname{argmax}} p(z|x)$$

$$\hat{x}_{MAP} = \underset{x}{\operatorname{argmax}} p(z|x) p(x)$$

2. Nell'ipotesi che ci sia una osservazione $z_t = \begin{bmatrix} 0.55 \\ -0.25 \end{bmatrix}$, usando ML, stimare la posizione del robot (modi e ampiezza)



3. Applicare il filtro di Kalman con criterio max. $\left[\mu_t = \begin{bmatrix} 1,67 \\ 0,75 \end{bmatrix} \right]$

ESERCIZIO TECNICHE SIMBOLICHE

$\{A, B, C, D, E\}$ possibili azioni:

Dimostrazioni (input) \rightarrow grafo di precedenza (output)

1) A C B D E

2) C A B E D

3) E C A B D

1) ~~(A,C)~~ (A,B) (A,D) ~~(A,E)~~ (C,B) (C,D) ~~(C,E)~~

(B,D) ~~(B,E)~~ ~~(D,E)~~

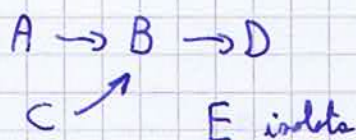
2) ~~(C,A)~~ (C,B) ~~(C,E)~~ (C,D) (A,B) ~~(A,E)~~ (A,D) ~~(B,E)~~, (B,D), ~~(E)~~

Mantengo solo quelle compatibili:

Taccio l'ultimo giro

3) ~~(E,C)~~ ~~(E,A)~~ ~~(E,B)~~ ~~(E,D)~~ ~~(C,A)~~ (C,B) (C,D) (A,B) (A,D) (B,D)

Costruisco il grafo



$\{A, B, C, D\}$

1. A B D C

2. D A B C

3. A D B C

AB ~~AD~~ AC ~~BD~~ BC DC

~~DA~~ ~~DB~~ DC AB AC BC

~~AD~~ AB AC ~~DB~~ DC BC

$A \rightarrow B \rightarrow C$

D \nearrow