

Homework 2

Exercise 1

(a) $X = \{1,2,3,4,5,6\}$

$A = \{\text{Up,Down,Left,Right}\}$

(b) $P_{\text{Up}} = \begin{bmatrix} [0.8 & 0.1 & 0.0 & 0.1 & 0.0 & 0.0] \\ [0.1 & 0.7 & 0.1 & 0.0 & 0.1 & 0.0] \\ [0.0 & 0.1 & 0.8 & 0.0 & 0.0 & 0.1] \\ [0.6 & 0.0 & 0.0 & 0.3 & 0.1 & 0.0] \\ [0.0 & 0.6 & 0.0 & 0.1 & 0.2 & 0.1] \\ [0.0 & 0.0 & 0.6 & 0.0 & 0.1 & 0.3] \end{bmatrix}$

$P_{\text{Down}} = \begin{bmatrix} [0.3 & 0.1 & 0.0 & 0.6 & 0.0 & 0.0] \\ [0.1 & 0.2 & 0.1 & 0.0 & 0.6 & 0.0] \\ [0.0 & 0.1 & 0.3 & 0.0 & 0.0 & 0.6] \\ [0.1 & 0.0 & 0.0 & 0.8 & 0.1 & 0.0] \\ [0.0 & 0.1 & 0.0 & 0.1 & 0.7 & 0.1] \\ [0.0 & 0.0 & 0.1 & 0.0 & 0.1 & 0.8] \end{bmatrix}$

$P_{\text{Left}} = \begin{bmatrix} [0.8 & 0.1 & 0.0 & 0.1 & 0.0 & 0.0] \\ [0.6 & 0.2 & 0.1 & 0.0 & 0.1 & 0.0] \\ [0.0 & 0.6 & 0.3 & 0.0 & 0.0 & 0.1] \\ [0.1 & 0.0 & 0.0 & 0.8 & 0.1 & 0.0] \\ [0.0 & 0.1 & 0.0 & 0.6 & 0.2 & 0.1] \\ [0.0 & 0.0 & 0.1 & 0.0 & 0.6 & 0.3] \end{bmatrix}$

$P_{\text{Right}} = \begin{bmatrix} [0.3 & 0.6 & 0.0 & 0.1 & 0.0 & 0.0] \\ [0.1 & 0.2 & 0.6 & 0.0 & 0.1 & 0.0] \\ [0.0 & 0.1 & 0.8 & 0.0 & 0.0 & 0.1] \\ [0.1 & 0.0 & 0.0 & 0.3 & 0.6 & 0.0] \\ [0.0 & 0.1 & 0.0 & 0.1 & 0.2 & 0.6] \\ [0.0 & 0.0 & 0.1 & 0.0 & 0.1 & 0.8] \end{bmatrix}$

$$C = \begin{bmatrix} 0.5 & 0.5 & 0.5 & 0.5 \\ 0.5 & 0.5 & 0.5 & 0.5 \\ 0.5 & 0.5 & 0.5 & 0.5 \\ 0.5 & 0.5 & 0.5 & 0.5 \\ 1.0 & 1.0 & 1.0 & 1.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \end{bmatrix}$$

$$(c) \quad \mathbf{J}^\pi = (\mathbf{I} - \gamma \mathbf{P}_\pi)^{-1} \mathbf{c}_\pi$$

$$\mathbf{I} = \begin{bmatrix} 1.0 & 0.0 & 0.0 & 0.0 & 0.0 & 0.0 \\ 0.0 & 1.0 & 0.0 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.0 & 1.0 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.0 & 1.0 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 & 1.0 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 & 0.0 & 1.0 \end{bmatrix}$$

$$\gamma = 0.9$$

$$C_{Up} = \begin{bmatrix} 0.5 \\ 0.5 \\ 0.5 \\ 0.5 \\ 1.0 \\ 0.0 \end{bmatrix}$$

$$\mathbf{J}^{Up} = (\mathbf{I} - \gamma \mathbf{P}_{Up})^{-1} \mathbf{C}_{Up}$$

$$\mathbf{J}^{Up} = \begin{bmatrix} 5.08361 \\ 5.12162 \\ 4.79477 \\ 5.13848 \\ 5.62162 \\ 4.23990 \end{bmatrix}$$