

Stats 115 Homework 2

1.1 The current state is low battery

1.2 The available actions are **charge** and **work**

1.3 The next states possible are fully charged, shut down, and task complete

$$\begin{aligned} EU(\text{charge}) &= 0.9 \times U(\text{fully charged}) + 0.1 \times U(\text{shut down}) \\ &= 0.9 \times -10 + 0.1 \times -100 = -19 \end{aligned}$$

$$\begin{aligned} EU(\text{work}) &= 0.7 \times U(\text{shut down}) + 0.3 \times U(\text{task complete}) \\ &= 0.7 \times -100 + 0.3 \times 80 = -46 \end{aligned}$$

1.5 You should choose to **charge**

2.6 The possible current states are low battery and high battery

2.7 The available actions are **charge** and **work**

$$\begin{aligned} p(s' = \text{shut down} \mid \text{work}) &= \sum_{s \in S} p(s) p(s' = \text{shut down} \mid s, \text{work}) \\ &= 0.8 \times 0.7 + 0.2 \times 0.2 = 0.6 \end{aligned}$$

$$\begin{aligned} EU(\text{charge}) &= \sum_{s' \in S} U(s') \sum_{s \in S} p(s) p(s' \mid s, \text{charge}) \\ &= -10 \times [0.8 \times 0.9 + 0.2 \times 1] + -100 \times [0.8 \times 0.1 + 0.2 \times 0] = -17.2 \end{aligned}$$

$$\begin{aligned} EU(\text{work}) &= \sum_{s' \in S} U(s') \sum_{s \in S} p(s) p(s' \mid s, \text{work}) \\ &= 80 \times [0.8 \times 0.3 + 0.2 \times 0.8] + -100 \times [0.8 \times 0.7 + 0.2 \times 0.2] = -28 \end{aligned}$$

2.10 You should choose to **charge**