

Assignment 3 - Part 1

Roll number used: 2019101009

x: 0.8

y: 2

Formula used:

$$b'(s') = \alpha P(\epsilon|s') \sum P(s'|s, a) \cdot b(s)$$

Where s is the current state, ϵ is the observation, a is the action and s' is iterated over all the states.

Action - RIGHT Observation - GREEN

$$b'(S1) = 0.1[0.2 * 0.3333 + 0.2 * 0] = 0.0066$$

$$b'(S2) = 0.85[0.8 * 0.3333 + 0.2 * 0.3333] = 0.2833$$

$$b'(S3) = 0.1[0.2 * 0 + 0.8 * 0] = 0.000$$

$$b'(S4) = 0.85[0.8 * 0.3333 + 0.2 * 0] = 0.2266$$

$$b'(S5) = 0.85[0.2 * 0.3333 + 0.8 * 0] = 0.0566$$

$$b'(S6) = 0.1[0.8 * 0.3333 + 0.2 * 0] = 0.0266$$

The above are before we normalize to make them sum to 1.

$$\Sigma b'(s) = 1/\alpha = 0.5997$$

$$\therefore b' = [0.0111, 0.4722, 0.0000, 0.3777, 0.0944, 0.0444]$$

Now we take this belief vector and use it for the next iteration.

Action - LEFT Observation - RED

$$b'(S1) = 0.9[0.8 * 0.0111 + 0.8 * 0.4722] = 0.3479$$

$$b'(S2) = 0.15[0.2 * 0.0111 + 0.8 * 0.0000] = 0.0003$$

$$b'(S3) = 0.9[0.2 * 0.4722 + 0.8 * 0.3777] = 0.3569$$

$$b'(S4) = 0.15[0.2 * 0.0000 + 0.8 * 0.0944] = 0.0113$$

$$b'(S5) = 0.15[0.2 * 0.3777 + 0.8 * 0.0444] = 0.0166$$

$$b'(S6) = 0.9[0.2 * 0.0944 + 0.2 * 0.0444] = 0.0249$$

$$1/\alpha = 0.7579$$

$$\therefore b' = [0.4589, 0.0004, 0.4707, 0.0149, 0.0219, 0.0329]$$

Action - LEFT Observation - GREEN

$$b'(S1) = 0.1[0.8 * 0.4589 + 0.8 * 0.0004] = 0.0367$$

$$b'(S2) = 0.85[0.8 * 0.4707 + 0.2 * 0.4589] = 0.3980$$

$$b'(S3) = 0.1[0.8 * 0.0149 + 0.2 * 0.0004] = 0.0012$$

$$b'(S4) = 0.85[0.8 * 0.0219 + 0.2 * 0.4707] = 0.0949$$

$$b'(S5) = 0.85[0.8 * 0.0329 + 0.2 * 0.0149] = 0.0249$$

$$b'(S6) = 0.1[0.2 * 0.0329 + 0.2 * 0.0219] = 0.0010$$

$$1/\alpha = 0.5567$$

$$\therefore b' = [0.0659, 0.7146, 0.0021, 0.1704, 0.0447, 0.0019]$$