1   SMDP: Average cost criteria

For Markov process, $t_{ij}(k)$ is no longer equal. Cannot use value iteration because $g(R)$ cannot be any arbitrary V_i. Solve using policy iteration

$$V_i(R) = C_{ik} - g(R)t_{ik} + \sum_{j=0}^{M} P_{ij}(k)V_j(R), \ \forall i \tag{1}$$

$$t_{ik} = \sum_{j=0}^{M} P_{ij}(k)t_{ij}(k) \tag{2}$$

$$c_{ik} = \sum_{j=0}^{M} P_{ij}(k)c_{ij}(k) \tag{3}$$

2   SMDP: Discounted cost criteria if $t_{ij}(k)$ is exponentially distributed

Solve using policy iteration

$$V_i(R) = C_{ik} + \sum_{j=0}^{M} e^{-\gamma t_{ij}(k)} P_{ij}(k)V_j(R) \quad \forall i \tag{4}$$

Solve using value iteration

$$V_i^n = \min_{k}[C_{ik} + \sum_{j=0}^{M} e^{-\gamma t_{ij}(k)} P_{ij}(k)V_j^{n-1}] \quad \forall i \tag{5}$$

Match $e^{-\gamma t_{ij}(k)}$ to $\beta^{t_{ij}(k)}$ to determine γ. Value iteration can be used.