

Random Equations

Aryan Ritwajeet Jha

hehe

$$J^*(X(t)) = \min_{u(t)} \left\{ J^*(X(t+1)) + g(X(t), X(t+1)) - U_0 \right\}$$

Discrete-time system:

$$x_{k+1} = f(x_k, u_k, w_k) \quad \text{where } k = 0, 1, \dots, N-1$$

Cost function that is additive over time:

$$J_N = \mathbb{E} \left[g_N(x_N) + \sum_{k=0}^{N-1} g_k(x_k, u_k, w_k) \right]$$

Cost of a Policy $\pi = \{\mu_0, \mu_1, \dots, \mu_{N-1}\}$ starting at initial state x_0 :

$$J_\pi(x_0) = \mathbb{E} \left[g_N(x_N) + \sum_{k=0}^{N-1} g_k(x_k, \mu_k(u_k), w_k) \right]$$

Optimal Cost Function:

$$J^*(x_0) = \min_{\pi} J_\pi(x_0)$$