Meeting

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Progress report

$$\bar{y} = 1 - \frac{y}{\max(y)} \tag{1}$$

	β	ϕ
Rise time(sec)	μ=0.5887 σ=0.3575	μ=0.4132 σ=0.4636
2% Settling time(sec)	μ=4.6819 σ=3.3599	μ=4.3516 σ=3.3567
5% Settling time(sec)	μ=2.4018 σ=2.8485	μ=2.2058 σ=2.7957
Overshoot(%)	μ= 9.0915 σ=21.5718	μ= 8.9186 σ=21.3232
Undershoot(%)	μ= 6.3101 σ=23.0001	μ= 4.6244 σ=17.7231

Stochastic policy

Using Stochastic policy to replace the controller.($\pi : S \to \mathbb{P}(X \in A)$)

$$a_t \sim \pi_\theta(\,\cdot\,|s_t) \tag{2}$$

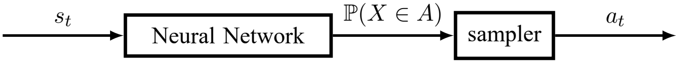

Figure 1: Stochastic policy

Multinomial logistic regression

The one way to determine the probability of classify problem is using multinomial logistic regression.

$$\ln\left(\mathbb{P}\left(Y=i\right)\right) \triangleq \beta_i \mathbf{x} - \ln z \tag{3}$$

$$\mathbb{P}\left(Y=i\right) = \frac{1}{z} e^{\beta_i \mathbf{x}} \tag{4}$$

where $i \in [1, n],\ \mathbf{x} \in \mathbb{R}^n$ and $\beta \in \mathbb{R}^{n \times n}$. The β is adjustable value.
From the probability theory,

$$\sum_{j=1}^{n} \mathbb{P}\left(Y=j\right) = 1 = \frac{1}{z} e^{\beta_j \mathbf{x}}$$

$$\Rightarrow\ z = \sum_{j=1}^{n} e_k^{\beta_j \mathbf{x}} \tag{5}$$

Stochastic policy

We use Softmax function(or normalization exponential function) to transfer the output to the probability.

$$\mathbb{P}(Y) = \text{softmax}(i, \mathbf{x}) = \frac{\mathrm{e}^{x_i}}{\sum\limits_{j=1}^{n} \mathrm{e}^{x_j}} \tag{6}$$