

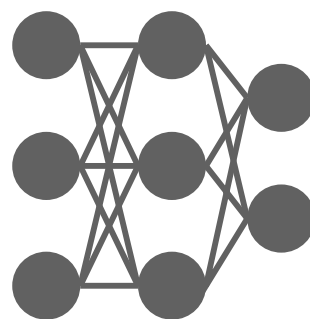
$$\begin{cases} \min_{x \in \mathbb{R}, y \in \mathbb{Z}} (a - x)^2 + 50(y - x^2)^2 \\ \text{s. t. } y \geq \frac{1}{2}b, x^2 \leq b, x \leq 0, y \geq 0 \end{cases}$$

Input: $a = 3.83, b = 6.04$

Solution Mapping π_{Θ_1}
as Continuous Relaxation

Hidden State:

$$h_x = -0.69, h_y = -1.84$$



Neural Network φ_{Θ_2}

Relaxed Solution:

$$\bar{x} = -1.14, \bar{y} = 3.09$$

Update Continuous Var:

$$\hat{x} = \bar{x} + h_x = -1.83$$

Round Integer Var:

$$v = \text{Sigmoid}(h_y) = 0.14$$

$$\bar{y} - \lfloor \bar{y} \rfloor < v \rightarrow \hat{y} = \lfloor \bar{y} \rfloor = 3$$

Loss Function: $\mathcal{L}_{Obj} + \lambda \cdot \mathcal{L}_{Penalty}$