

# ⑧ measuring Invariance in DL

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## Measuring invariance in DL

- Measuring Invariance :

firing neuron,  $s_i h_i(x) > \tau_i$

$$s_i \in \{-1, 1\} // \text{choose } s_i \text{ to maximize}$$

$$\text{firing, } f_i(x) = 1_{\{s_i h_i(x) > \tau_i\}}$$

Transformation function:  $\tau(x, y)$

Local trajectory  $T(x) \rightarrow$  semantically similar stimuli

$$T(x) = \{ \tau(x, y) \mid y \in \Gamma \}$$

Global stimuli  $G(i) = \mathbb{E}[f_i(x)] // \text{over all possible input}$

local firing rate  $L(i) = \frac{1}{|Z|} \sum_{z \in Z} \frac{1}{|T(z)|} \sum_{x \in T(z)} f_i(x) // \text{only over semantically similar input}$

invariance score, 
$$s(i) = \frac{L(i)}{G(i)}$$