



# Episode Based Training (2)



We are going to treat this as mini-batch training

$$\mathcal{L}_{\text{episode}}(S, Q) = \sum_{i=1}^m \sum_{j=1}^n \left( r_{i,j} - 1(y_i == y_j) \right)^2$$

: loss for an episode defined by the  
support set  $S$  and the query set  $Q$

$$\varphi, \phi \leftarrow \arg \min_{\varphi, \phi} \mathbb{E}_{L \sim \mathcal{T}} \left[ \mathbb{E}_{S \sim L, Q \sim L} \left[ \mathcal{L}_{\text{episode}}(S, Q) \right] \right]$$



sampling a label set over a distribution over possible label sets  $\mathcal{T}$



$S \sim L$  and  $Q \sim L$  represent sampling the support set  $S$  and query set  $Q$  from  $L$





Label of image  $i$

Label of image  $j$

Relation score of  
query image  $j$  with  
sample image  $i$

# Episode Based Training (2)

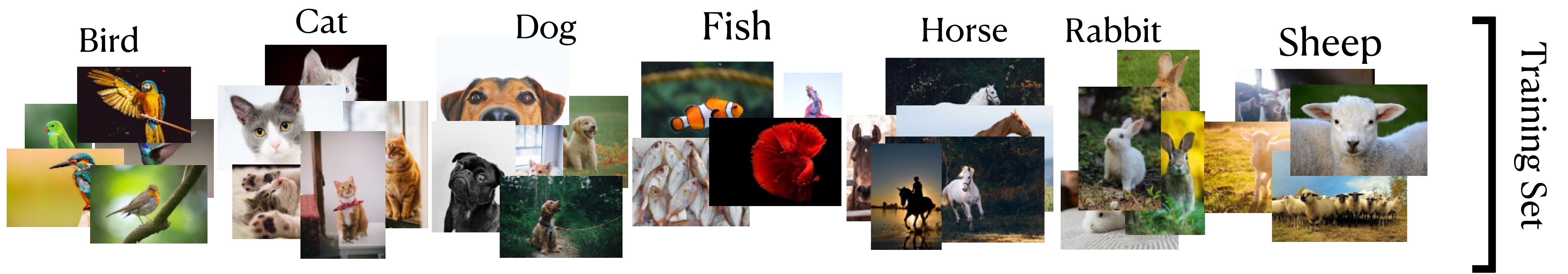
We are going to treat episodes as mini-batches in training

$$\mathcal{L}_{\text{episode}}(S, Q) = \sum_{i=1}^m \sum_{j=1}^n \left( r_{i,j} - 1(y_i = y_j) \right)^2 \quad \begin{array}{l} \text{: loss for an episode defined by the} \\ \text{support set } S \text{ and the query set } Q \end{array}$$

$S \sim L$  and  $Q \sim L$  represent sampling the support set  $S$  and query set  $Q$  from  $L$

$$\varphi, \phi \leftarrow \arg \min_{\varphi, \phi} \underbrace{\mathbb{E}_{L \sim \mathcal{T}}}_{\text{sampling a label set over a distribution over possible label sets } \mathcal{T}} \left[ \overbrace{\mathbb{E}_{S \sim L, Q \sim L}}^{\text{episode based training}} \left[ \mathcal{L}_{\text{episode}}(S, Q) \right] \right]$$

sampling a label set over a distribution over possible label sets  $\mathcal{T}$



$L \sim \mathcal{T}$

$S \sim L$

$Q \sim L$

$f_{\phi}(image)$

Embedding  
Module

$g_{\phi}(e_1, e_2)$

Relation  
Module

$$\phi, \phi \leftarrow \arg \min_{\phi, \phi} \mathbb{E}_{L \sim \mathcal{T}} \left[ \mathbb{E}_{S \sim L, Q \sim L} \left[ \mathcal{L}_{\text{episode}}(S, Q) \right] \right]$$

$$\mathcal{L}_{\text{episode}}(S, Q) = \sum_{i=1}^m \sum_{j=1}^n \left( r_{i,j} - 1(y_i = y_j) \right)^2$$