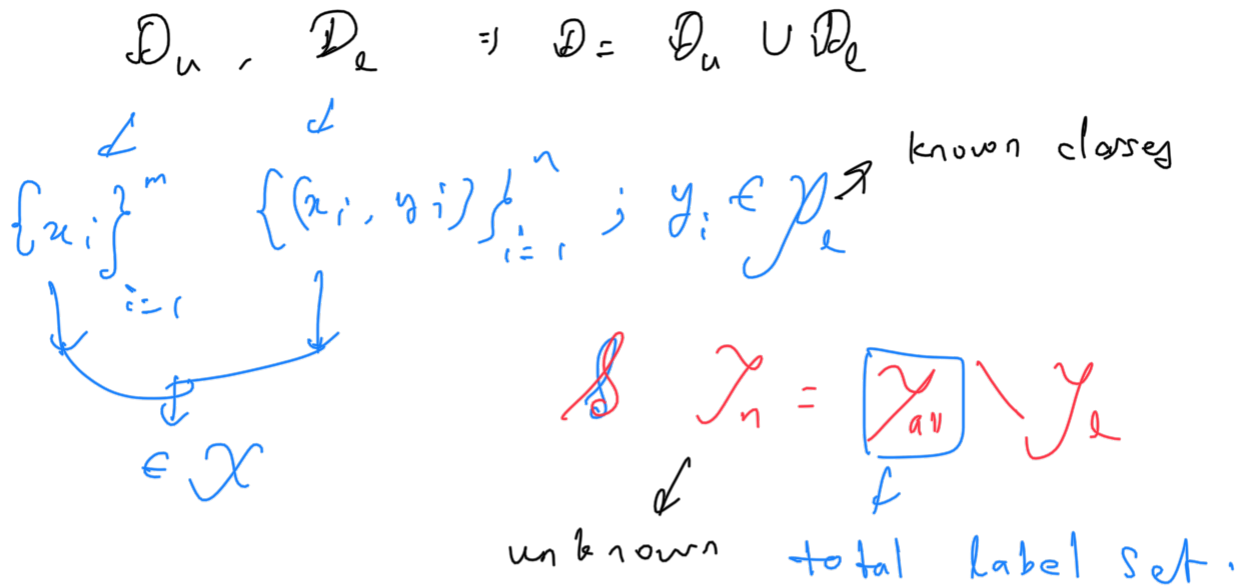


## Open world contrastive learning

Problem formulation:



Generalized Contrastive losses:

$$\log(x; c, P(x), M(y)) = \frac{1}{|P(y)|} \sum_{z^+ \in P(y)} \log \frac{\exp(z^T \cdot z^+ / c)}{\sum_{z^- \in M(y)} \exp(z^T \cdot z^- / c)}$$

Prototype-based learning

Prototype embedding vectors:  $\mu_c; c \in \mathcal{Y}_{av}$

randomly initialized prototype vector

$$m = \underbrace{[\mu_1 \mid \mu_2 \mid \mu_3 \mid \dots \mid \mu_c \mid \dots]}_{\text{cardinality } |Y_{\text{all}}|} \quad c \in Y_{\text{all}}$$

prototype based novelty

propose a set formulation:

$$D_n = \{x_i \mid \max_{j \in Y_L} \mu_j^T \cdot \phi(x_i) < \lambda\}$$

chosen based on  
labeled classes.

[class balanced??]

score

$$\max_{j \in Y_L} \mu_j^T \cdot \phi(x_i) \quad \boxed{:\mid x_i \in D_n}$$

prototype based Set Selection:

