

DOMAIN GENERALIZATION

Recap: Domain Adaptation

- Training: "labeled source examples" $\{(x_i^s, y_i^s)\}_{i=1}^{m_s}$
+ "unlabeled target samples:" $\{x_i^t\}_{i=1}^{m_t}$
- Goal: find a function $h \in H$
s.t. h performs well on the target domain
(e.g. training a N.N. which has high acc. of target domain)

DG

GIVEN

- "labeled source examples"
(could be from multiple sources)

- assume set \mathcal{S} of source domains

$$P^s \sim \{(x_i^s, y_i^s)\}_{i=1}^{m_s} \quad \forall s \in \mathcal{S}$$

GOAL train a model f on source data \mathcal{S}
& hope that it works on an
UNSEEN target domain

GOAL: find f that performs well on target T

@ test time $P^t \sim \{(x_i^t, y_i^t)\}_{i=1}^{m_t} \quad \forall t \in T$

@ Test Time: @ evaluate on **TARGET**

example

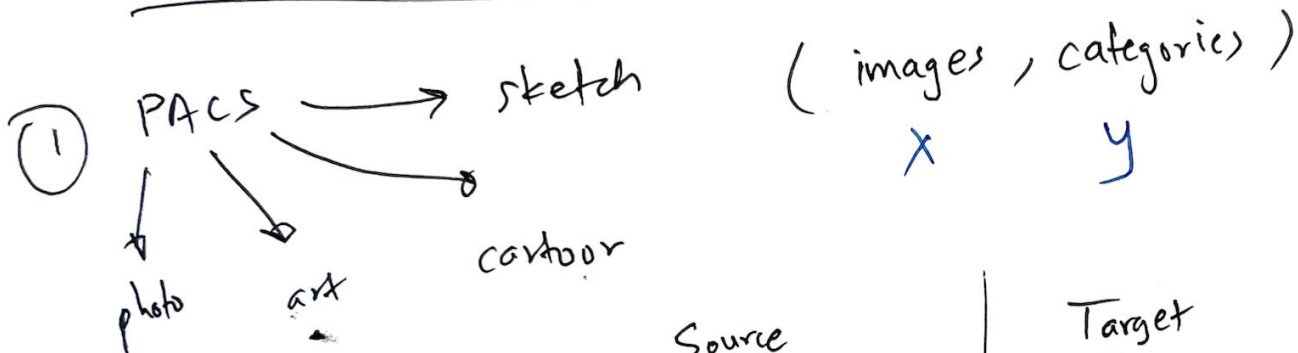
sentences from
NYT, WSJ, BS
"sources"

Reddit "target"
Gothic novels "target"

$$\mathcal{E}^t(h) = \mathbb{E}_{(x,y) \sim p^t} [h(x) \neq y]$$

$$\text{Loss} = \mathbb{E}_{x,y \sim p^t} [\ell(h(x), y)]$$

* EXAMPLE DATASETS



uns-D-A : Source
 P
 + some unlabelled
 A, C, S

Target
 A, C, S

DG P
 ~ DomainNet, VLCS

② Color MNIST,

S
 black & white
 digits
 0-9

T
 colored
 digits,
 colored
 background



BASELINE "naive"

→ just use standard training ERM

"nothing special"

$$\text{minimize } \theta \quad \frac{1}{|S|} \sum_{s=1}^{|S|} \mathbb{E}_{x,y \sim p^s} \ell(h(x_i^s), y)$$