Ncd without forgetting

Formulation:

Labeled data $\mathcal{D}_{lab} = \{(x_i, y_i) \sim P(x, y_{lab})\}$

model ψ

unlabeled $\mathcal{D}_{unlab} = \{(x_i) \sim P(x | y_u)\}$

$$\mathcal{Y}_l \cap \mathcal{Y}_u = \emptyset$$

Feature extractor: ϕ_{FE} } ψ

Labeled head ϕ_{LAB}

unlabeled head ϕ_{ulab}

Constraint: Labeled data can't be accessed during VCD time

Utilize feature Distillation loss L_{FD}

$$L_{FD} = \| \phi_{fr}(x) - \phi_{FE}^{lab}(x) \|_2^2$$

trained on lab (frozen layer of model)

model regularizer.

① Retain performance in L :

- Generate Pseudo-latents.

(from for labeled training data)

that maximally activate c class.

step 1 - sample z_i

Latent inversion : frozen.

$$\Rightarrow \quad p_i = \phi_{Lab}(z_i)$$

$$\Rightarrow \quad z_{i+1} = z_i + \nabla p_i[c]$$

corresponding class mean of labeled training instances z_μ^c

Not Sure Why

Return Dictionary for pseudo-labels for the labeled classes D_{pseudo}

(v) Enhancing VCD

→ Sinkhorn-Knopp clustering:

→ for $x \in D_{unlab}$

$$l = \phi_L\left(\phi_{fe}(x)\right)$$

$$u = \phi_u\left(\phi_{fe}(x)\right)$$

$$I(l;u) = H(l) - H(l|u)$$

$$= -E_l\left[\log p(l)\right] + E_{l,u}\left[\log p(l|u)\right]$$

$$\geq -E_l\left[\log p(l)\right] + E_{l,u} \log q(l|u)$$

$$+ \quad E_u\left[KL\left[p(l|u) \,\|\, q(l|u) \right] \right]$$

$$I(l;u) \geq -E_l\left[\log p(l)\right] + E_{l,u}\left[\log q(l|u)\right]$$

$$= -E_l\left[\log p(l)\right] + E_{l,u}\left[\sum_{i=1}^{n} \log \sigma_w^i \right.$$

$$\left. - \mathcal{L}_{MI} \left\{ + \frac{(l_i - \mu_\theta(u))^2}{2(\sigma_w^i)^2} \right\} \right]$$

[gaussian simplification]